CHAPTER 4 ENVIRONMENTAL CONSEQUENCES

4.1 INTRODUCTION

This chapter is organized by resource topic and evaluates the potential environmental impacts that could occur from implementing the resource management plan (RMP) alternatives described in Chapter 2. Potential impacts considered in this chapter include, aesthetic, historic, cultural, economic, social, and health (Title 40 Code of Federal Regulations Section 1508.8 [40 CFR 1508.8]) impacts.

Impacts on resource programs are analyzed and discussed in detail commensurate with the significance of the resource issues and concerns identified throughout the process. The impact analysis for Alternative A (No Action or Continuation of Present Management) was prepared as the baseline for comparison of the alternatives. The introductory section of each resource program establishes the scope of the analysis, describes the general types of impacts involved, and presents the assumptions associated with the resource program under consideration. Impacts on each resource program from implementing the management decisions are grouped by impact type and where possible, the impacts are grouped and addressed collectively.

Throughout this chapter, the terms "*Planning Area*" and "*Decision Area*" refer to geographic boundaries. "*Planning Area*" includes all land, public, State trust and private, within Sierra, Otero, and Doña Ana counties. The term "*Decision Area*" describes public land and the subsurface Federal mineral estate administered by the Bureau of Land Management (BLM) within the three counties for which BLM has the authority to make decisions. Impacts are described for the *Decision Area* unless otherwise noted as being limited to a specific county(s) or other geographic area.

4.1.1 TYPES OF IMPACTS

Impacts are defined as the changes to the existing environment or management situation that would result from implementing the actions described under the alternatives in Chapter 2. The following analysis focuses on identifying types of impacts and estimating their potential effects on the resources, resource uses, special designations, and support programs. This chapter uses the terms "*impacts*" and "*effects*" interchangeably and the terms "*increase*" and "*decrease*" for comparison purposes (Table 4-1).

TABLE 4-1
TYPES OF IMPACTS

DIRECT IMPACTS	These are effects that are caused by the action and occur at the same time and place as the action. For example, original land use is eliminated when a structure is built. Direct impacts may cause indirect impacts, such as ground disturbance resulting in particulate matter emissions (dust).
INDIRECT IMPACTS	These are effects caused by the action, but occur later than or are somewhat distant from the action; however, they are still reasonably foreseeable and related to the action by a chain of cause and effect. Indirect impacts may reach beyond the natural and physical environment to include growth-inducing effects related to changes in the pattern of land use, population density or growth rate, and related effects on air and water and ecosystems.
CUMULATIVE IMPACTS	These are effects that result from the incremental impact of the action when it is added to other past, present, and reasonably foreseeable future actions, regardless of what agency (Federal or non-Federal) or person undertakes such actions. Cumulative impacts may result from actions that take place over time and that are individually minor, but are collectively significant.

4.1.2 ANALYTICAL ASSUMPTIONS

The analysis considers the context, intensity, and duration of an impact. "*Context*" relates to environmental circumstances at the location of the impact and in the immediate vicinity, affected interests, and the locality. "*Intensity*" refers to the severity or extent of the impact or magnitude of change from existing conditions. "*Duration*" refers to the permanence or longevity of the impact and is characterized as short-term or long-term. "*Short-term*" is defined as anticipated to begin and end within the first 5 years after the action is implemented. "*Long-term*" is defined as lasting beyond 5 years.

For ease of reading, impacts presented are direct, broad (occurring within the *Planning Area*), and long-term, unless otherwise noted as indirect, localized, or short-term/temporary. As impacts may be perceived as beneficial (positive) or adverse (negative) by different readers, these descriptors were not used in defining impacts.

The impact analysis and conclusions are based on the BLM's knowledge of resources, reviews of existing literature, and information provided by BLM experts, other agencies, interest groups, and concerned citizens. Geographic information system (GIS) analyses and data from field investigations were used to quantify effects where possible. In the absence of quantitative data, qualitative information and best professional judgment were used. Acreage calculations and other numbers used are approximate and cumulative, representing the maximum foreseeable acreage impacts; actual impacts may be less. These values may differ from previous reports due to revisions in data or due to using different technical methods. They are provided for comparison and analytic purposes; they do not reflect exact measures of on-the-ground situations. At times, impacts are described using ranges of potential impacts or in qualitative terms.

The analysis assumes that necessary Best Management Practices (BMPs) would be employed and mitigation would be added that could reduce the potential effect on resources, resource uses and social and economic conditions. Appendix D contains examples of BMPs and standard operating procedures that are site-specific tools to minimize or mitigate impacts on resources, and would be applied and adjusted on a case-by-case basis.

The following assumptions were used in the analysis; additional assumptions are presented under each resource or use topic where appropriate:

- Management actions proposed in the alternatives apply to public lands only. The cumulative impacts analysis considers potential actions by individuals or entities other than the BLM.
- The alternatives would be implemented in accordance with laws, regulations, and standard management guidelines.
- BLM policies, including Standards of Rangeland Health and Guidelines for Livestock Grazing Management (BLM 2000a), would be applied as appropriate across all alternatives. Standards and Guidelines would assess rangeland health and provide strategies to achieve desired resource conditions and management objectives.
- Funding would be available to implement the alternatives, as described in Chapter 2.
- Mitigation requirements would prevent or limit direct impacts associated with land use activities, or would result in reclamation of the land after the activity has been completed. Restrictions or prohibitions on activities in specific areas would protect sensitive resources.
- The level of activity on BLM-administered land is expected to increase, based on historical trends, existing land use agreements such as leases or permits, and statements of interest in land use by individuals and industry organizations.

- Wherever possible, impacts are quantified to the extent that information is available. Figures are not exact and may vary depending on technologies used. Relative values are more reflective of effects than actual numbers.

4.1.3 INCOMPLETE OR UNAVAILABLE INFORMATION

Site-specific data are used to the extent possible. The best available information pertinent to management actions was used in developing this EIS. Considerable effort has been taken to acquire and convert resource data into digital format for use in the RMP/EIS. Data were acquired from the BLM and outside sources, such as the New Mexico Department of Game and Fish (NMDGF) and county road departments. However, certain information was unavailable for use in developing this RMP/EIS, usually because inventories have not been conducted or are incomplete, for example:

- Transportation inventories are not complete.
- Location and extent of future grassland restoration projects are largely unknown; however, areas have been identified as potential within priority watershed areas.
- Location and extent of potential wind energy projects are largely unknown.
- A comprehensive inventory of invasive species has not been completed.
- Comprehensive information for population trends of special status species is incomplete.
- Range condition data in the BLM GIS were obtained in the 1980s. Comprehensive information for ecological condition data is incomplete.
- Aquatic invertebrates, and the composition and structure of aquatic communities are not thoroughly understood. Their responses to resource use are also poorly understood.
- Water quality information is recorded at only a few locations in the *Planning Area*.

For resources with incomplete or unavailable information, estimates were made regarding the number, type, and significance based on previous surveys and existing knowledge. Additionally, some impacts cannot be quantified given the proposed management actions. Where this gap occurs, impacts are projected in qualitative terms. Ongoing inventory efforts by the BLM and other agencies within the *Planning Area* continue to update and refine information that will be used to implement this RMP.

4.2 IMPACTS OF ALTERNATIVES

Table 4-2 shows a summary of the land use allocation decisions by acres, number of units or miles for each alternative for each resource and resource use. That table is followed by a detailed analysis of the environmental consequences of the proposed decisions of each alternative on components of the human environment. The analysis is based on the issues associated with each of those components including natural and cultural resources, resource uses, and social and economic conditions.

TABLE 4-2 SUMMARY COMPARISON OF LAND USE ALLOCATIONS BY ALTERNATIVE				
LAND USE	**Acres[1]**			
	Alternative A	**Alternative B**	**Alternative C**	**Alternative D**
Special Designations				
WSAs (number, acres)	10 261,793	10 261,793	10 261,793	10 261,793
ACECs (number, acres)				
Existing	13 89,723	13 91,477	12 87,731	12 85,977
Proposed	0 0	16 425,997	11 216,311	0 0
Total ACECs	13 89,723	29 517,774	23 304,042	12 85,977
Kilbourne Hole NL (number, acres)	1 5,500	1 5,500	1 5,500	1 5,500
Wild & Scenic River Suitability (miles)	0	3.5	0	1.4
Lands with Wilderness Characteristics				
LWCs (number, acres)	0 0	4 11,917	3 803	1 423
Vegetation				
Vegetation allocation changes as a result of grassland restoration treatments.	No allocation priorities.	Reserved for watershed function and wildlife.	Reserved to meet the needs of watershed function. Excess allocated to wildlife and livestock, with wildlife receiving priority.	Allocated to wildlife and livestock with neither having priority.
Fish and Wildlife Habitat				
Habitat Management Plans (number, acres)	9 1,188,349	4 1,416,965	4 1,416,729	4 1,416,729
Visual Resource Management				
Class I	38,521	343,253	271,406	265,526
Class II	578,348	893,669	638,331	689,513
Class III	840,655	806,869	809,938	810,179
Class IV	1,375,138	789,420	1,113,396	1,066,866

TABLE 4-2 SUMMARY COMPARISON OF LAND USE ALLOCATIONS BY ALTERNATIVE				
LAND USE	**Acres[1]**			
	Alternative A	**Alternative B**	**Alternative C**	**Alternative D**
Livestock Grazing				
Area Closed To Grazing	2,049 acres of sensitive resources (wildlife and cultural)	Discontinue the authorization of livestock grazing in allotments, in whole or in part, with unmanageable conflicts. 17,602 acres of allotments that have no grazing authorization or with conflicts would be closed conflicts.	Discontinue the authorization of livestock grazing in allotments, in whole or in part, with unmanageable conflicts only after (1) a land health assessment/ evaluation, (2) a determination , and (3) a decision to reallocate the lands to a public purpose that precludes livestock grazing. 17,602 acres of allotments that have no grazing authorization or with conflicts would be closed.	1,156 acres of sensitive resources (wildlife and cultural)
Livestock Grazing Adjustments	Changes made on an as needed basis, case-by-case, based on monitoring.	25% reduction of AUMs on areas with limited restoration potential (950,000).	Changes to grazing made in priority watersheds based on monitoring of vegetation, soils, hydrology, and other variables associated with healthy ecological systems	Changes made on an as needed basis, case-by-case, based on monitoring.
Comprehensive Trails and Travel Management				
Open to OHV use	1,635,694	38,966	41,908	41,908
Limited to Existing Routes	878,636	2,003,188	2,284,102	2,496,266
Limited to Designated Routes	272,021	531,994	492,616	277,336
Closed to OHV Use	42,953	259,891	19,218	17,485

TABLE 4-2 SUMMARY COMPARISON OF LAND USE ALLOCATIONS BY ALTERNATIVE				
LAND USE	**Acres[1]**			
	Alternative A	**Alternative B**	**Alternative C**	**Alternative D**
Recreation and Visitor Services				
SRMA (numbers, acres)	2 69,151	3 83,003	3 83,003	4 83,233
ERMA (number, acres)	0 0	2 38,954	3 68,407	5 110,340
Closed to Discharge of Firearms	10,440	44,770	40,310	37,550
Lands and Realty				
Land Identified for Disposal	213,199	38,273	108,450	186,523
ROW Avoidance Areas	13,222	109,074	422,910	453,000
ROW Exclusion Areas	518,839	919,953	343,060	308,000
Utility Corridors	17,613	149,835	208,891	224,875
Renewable Energy				
Solar Energy Zones (number, acres)	0 0	1 29,964	1 29,964	1 29,964
Exclusion and avoidance [4] Solar Wind	532,061 532,061	2,759,149 1,598,929	1,559,146 1,618,659	1,562,616 1,532,657
Minerals				
Segregated from mineral entry	10,976	10,976	10,976	10,976
Oil and Gas				
Existing Leases	52,705	52,705	52,705	52,705
Open with Standard Lease Terms & Conditions	3,655,138	0	0	0
Open – No Surface Occupancy	27,534	856	856	856
Open – Controlled Surface Use	169,710	0	0	0
Open with Lease Notice	239,307	0	0	0
Discretionary Closure	75,020	75,020	75,020	75,020
Non-discretionary Closure[2]	258,186	258,186	258,186	258,186
Deferred from New Leasing	-	3,593,047	3,593,047	3,593,047

TABLE 4-2 SUMMARY COMPARISON OF LAND USE ALLOCATIONS BY ALTERNATIVE				
LAND USE	**Acres[1]**			
	Alternative A	**Alternative B**	**Alternative C**	**Alternative D**
Geothermal Leasing				
Existing Leases	440	440	440	440
Discretionary Closure[2]	75,020	571,930	358,045	75,020
Non-Discretionary Closure[2]	258,186	258,186	258,186	258,186
Open with Stipulations or Standard Terms and Conditions	3,194,610	3,154,014	3,222,397	3,630,721
Locatable Minerals				
Open to entry under General Mining Laws[3]	4,331,744	3,649,337	3,993,937	4,277,979
Recommended withdrawal under the General Mining Laws	71,488	682,407	337,807	53,765
Mineral (Salable) Materials				
Open Mineral Material Sales[3]	3,908,761	3,771,434	3,644,196	3,996730
Closed Mineral Material	441,239	705,804	456,719	353,270

NOTES:
[1] Because of overlap with other designations, exclusion of some areas from the particular use, or other reason, total acres for any alternative may not add to the *Decision Area* Total for either surface or mineral estate.
[2] Where WSA acres (non-discretionary closure) and ACEC acres (discretionary closure) overlap, the more restrictive management (WSA-nondiscretionary closure) will prevail.
[3] Includes all subsurface estate regardless of surface ownership
[4] In many cases, acres of avoidance and exclusion overlap for both types of renewable energy projects.

4.2.1 IMPACTS ON SPECIAL DESIGNATIONS

4.2.1.1 Impacts on Areas of Critical Environmental Concern

The impact analysis associated with Areas of Critical Environmental Concern (ACECs) is limited to actual or potential changes to the values meeting the relevance and importance criteria (R&I) for which the area was proposed or designated (Appendix G). Impacts on these values occur where an action affects their naturalness or existing condition to such an extent that they no longer meet the R&I criteria. Impact descriptions are limited to management prescriptions specific to land within an ACEC (Tables 2-4 and 2-5), which could affect important historic, cultural, or scenic values; biological resources; or other natural systems or processes or that would protect life and safety from natural hazards.

The analysis of impacts on ACECs assumes that activities or developments on State or private inholdings would not be affected by ACEC management prescriptions, nor would the activities or developments on inholdings affect the conditions on public land warranting the special designation.

4.2.1.1.1 Impacts on ACECs Common to All Alternatives

Both the existing and proposed ACECs are managed much the same under all alternatives (Table 4-2). The primary differences among the alternatives are the number and total acreage of the ACECs that would be designated or managed under any one alternative.

Fire management in ACECs may continue to cause short-term reduction in values or resources meeting the R&I criteria. Implementing existing fire management plans that use fire as a natural process could promote retention of R&I values over the long-term, to the extent that wildfire use is employed in the ACEC. Prioritizing key habitats and resources for suppression could limit the loss of vegetation, promote maintenance of biological resources, and would limit the visual contrast caused by charred areas.

Surface disturbances in ACECs would be limited by closing areas to vehicle access or limiting access to designated routes, closing them to certain activities such as mineral material disposal, or restricting where these disturbances could occur. Any areas withdrawn from mineral entry would be protected in the long-term from surface disturbance caused by mining. The BLM would be required to authorize operations on pre-existing claims in withdrawn areas if the mining claims are determined to possess valid existing rights. Any surface disturbance caused by exercising valid existing rights on a claim within a withdrawn area would be managed under BLM's surface management regulations.

Kilbourne Hole Natural National Landmark would continue to be managed to protect the natural and geological features through limiting vehicle use to designated routes, and excluding new rights-of-way (ROWs). Acquiring non-Federal land would eliminate the possibility of incompatible development in the floor of the land mark. Closing the area to shooting would promote safety for those visiting or hiking in the area.

There would be no impacts to special designations from geothermal leasing and subsequent activities since all special designations would be discretionarily (ACECs) or non-discretionarily (wilderness study areas [WSAs]) closed to geothermal leasing.

4.2.1.1.2 Impacts of the Alternatives on ACECs

4.2.1.1.2.1 Alternative A Impacts on ACECs

Special Designations: Approximately 29,500 acres under Alternative A have overlapping designations of WSA and ACEC (see Table 4-3). In all cases the more restrictive WSA management would take precedent. This would protect the R&I values within the WSAs for which the ACECs were designated.

TABLE 4-3
AREAS OF OVERLAP BETWEEN WSA AND ACEC DESIGNATIONS

WSA NAME	ACEC NAME	ALTERNATIVE			
		A	B	C	D
Aden Lava Flow	Aden Lava Flow RNA	3,746	3,746	0	0
Organ Mountains	Organ Franklin Mountains	7,221	7,221	7,221	7,221
Organ Needles	Organ Franklin Mountains	5,934			
Peña Blanca	Organ Franklin Mountains	4,647	4,647	4,647	4,647
Robledo Mountains	Robledo Mountain	7,866	7,866	7,866	7,866
Brokeoff Mountains	Brokeoff Mountains	0	3,110	0	0
TOTAL		29,414	32,524	25,668	25,668

Recreation and Visitor Services: The Organ Mountains Special Recreation Management Area designation would overlap with the Organ/Franklin Mountains ACEC. Management of R&I values in the ACEC would have precedence over the management of outdoor recreation uses. Any impacts to R&I values would be mitigated or the project or activity would not occur.

Lands and Realty: Retaining public land within existing ACECs and pursuing land acquisitions from willing sellers would help to maintain and could indirectly increase protection of R&I resources in ACECs.

Minerals: Withdrawing areas to locatable mineral entry within 7 ACECs would reduce the potential for surface disturbance in these areas. These areas were designated to protect scenic values, special status species and habitat, and/or cultural and natural species; all of which are susceptible to damage or destruction from surface disturbing activities. Withdrawals would help maintain the relevant and important resources on 71,488 acres in the long-term.

Maintaining the withdrawal from mineral entry under the general land laws and mining laws (PLO 7375 January 12, 1999) in the Sacramento Escarpment ACEC would preserve the scenic values of the ACEC in the long term and protect the Sacramento prickly poppy and other special status species in the ACEC which are highly susceptible to surface disturbances. Closing the ACECs to fluid mineral leasing and mineral materials (e.g., sand, gravel, fill material) disposal would help protect geologic and scenic values by limiting surface disturbance.

4.2.1.1.2.2 Alternative B Impacts on ACECs

Special Designations: Thirteen existing ACECs would continue to be managed to protect R&I values (91,000 acres) and an additional 16 proposed ACECs totaling 426,297 acres would also be designated. Impacts from permitted activities would be similar to those under Alternative A, but protective measures would encompass a larger area over a greater number of ACECs. Scenic, cultural, and biological values would be protected by closing the areas to mineral material sale, limiting vehicle use to designated routes, excluding new rights-of-way and renewable energy. Managing additional acreage and areas as ACECs

and managing areas to meet Visual Resource Management (VRM) Class I and II objectives would restrict surface-disturbing activities and maintain R&I values in ACECs to a greater extent than Alternative A.

Recreation and Visitor Services: Recreation management area designations would overlap with ACEC designations in the Organ/Franklin Mountains, the Doña Ana Mountains, Tortugas Mountain, Picacho Peak, and the Three Rivers Petroglyph Site. Management of ACEC R&I values would have precedence over the management of outdoor recreation uses; therefore, any impacts to R&I values would be mitigated or the project or activity would not occur. Consequently there would be no impacts to R&I values from outdoor recreation management or facilities installation.

Lands and Realty: Retaining public land and pursuing land acquisitions from willing sellers in ACECs and WSAs would have the same impact on R&I values and wilderness characteristics as described under Alternative A, but impacts could potentially occur over a greater area.

Minerals: Existing oil and gas leases could be developed but there would be few impacts since the leases are few in number, widely scattered and no production is likely to occur. In the remainder of the *Decision Area* there would be no impacts to special designations from oil and gas leasing and development in the short-term since new leasing would be deferred until a programmatic oil and gas leasing EIS is developed.

4.2.1.1.2.3 Alternative C (Preferred Alternative) Impacts on ACECs

Special Designations: Impacts on ACECs from management actions that restrict surface disturbance would be similar to those described under Alternative B, but on 28 percent fewer acres. The effect of managing ACECs that overlap with WSAs would be similar to Alternative A, but would occur to a greater extent under this alternative.

Recreation and Visitor Services: Impacts from recreation management areas designations that overlap with ACEC designations would be the same as Alternative B.

Lands and Realty: Impacts would be similar to those in Alternative B but would occur over a smaller area due to the smaller size of the proposed Otero Mesa Grassland ACEC in Alternative C.

Minerals: Impacts from existing oil and gas leases would be the same as Alternative B.

4.2.1.1.2.4 Alternative D Impacts on ACECs

Special Designations: No new ACECs would be designated under this alternative. Impacts would be the same as Alternative A.

Recreation and Visitor Services: Impacts from recreation management areas designations that overlap with ACEC designations would be the same as Alternative B. Special Recreation Management Area (SRMA) designations would have similar impacts on ACECs as those discussed under Alternative A, a decrease of 8,000 acres relative to Alternative B, and a decrease of 5,300 acres relative to Alternative C.

Lands and Realty: Impacts from Alternative D would be the same as those described in Alternative A.

Minerals: These areas would continue to be closed to fluid mineral leasing as determined in previous RMPs and RMP amendments. There would be no impacts from mineral material disposal since the existing ACECs would continue to be closed to such disposal. Impacts from existing oil and gas leases would be the same as Alternative B.

4.2.1.2 Impacts on Historic Trails and Backcountry Byway

The Mormon Battalion Historic Trail and the Butterfield Historic Trail have potential for nomination to be National Historic Trails. The Camino Real de Tierra Adentro National Historic Trail was established by Congress. The Lake Valley Backcountry Byway was established in 1993. The analysis looks at how management decisions in the four alternatives might alter the user experience on these trails or alter the physical nature of the trails.

4.2.1.2.1 Impacts on Historic Trails and Byway Common to All Alternatives

Those areas on BLM-administered lands along the El Camino National Historic Trail that are visible within approximately 5 miles of high-potential sites and segments, and also in relatively undisturbed areas, would be designated Visual Resource Management (VRM) Class II. Impacts from ROWs and development would not detract from the historic context of the Trail.

Historic trails would lose physical definition if shrub control practices extended across trails. Enhancing grasslands by eliminating mesquite and creosote along trail corridors has the potential to destroy lengths of trail that were demarcated by the presence of the shrubs.

Public lands with evidence of the historic trails would not be disposed so that the integrity of the trails would remain intact. The Butterfield and Mormon Battalion historic trails would remain eligible for consideration as National Historic Trails.

On existing oil, gas and geothermal leases, the Butterfield and Mormon Battalion trails are open to leasing with No Surface Occupancy stipulations. The development of leases would increase visual intrusions and reduce the historic character of the trails.

4.2.1.2.2 Impacts of the Alternatives on Historic Trails and Byway

4.2.1.2.2.1 Alternative A Impacts on Historic Trails and Byway

Comprehensive Trails and Travel Management: In Sierra and Otero Counties, segments of historic trails on public land would be degraded by open off-highway vehicle (OHV) use because OHV use would cause erosion, and damage to vegetation which delineates the trails. Access to historic trails would not be limited.

Lands and Realty: ROW avoidance areas within ¼-mile each side of the Butterfield Trail would reduce the likelihood that roads, pipelines, and other infrastructure could be seen from the Trail. The 5-mile transmission line avoidance area on either side of the El Camino Real National Historic Trail would mitigate impacts to the integrity of the Trail if a major transmission line were proposed.

4.2.1.2.2.2 Alternative B Impacts on Historic Trails and Byway

Comprehensive Trails and Travel Management: Reducing the area where OHV is open would minimize impacts from OHV, such as erosion and soil disturbance along trails compared to Alternative A. However, accessibility to those portions of trails that are not near roads would be limited compared to Alternative A. Limiting vehicles to designated routes would reduce impacts to soil and vegetation, while still allowing for access to Trails.

Recreation and Visitor Services: The Picacho Peak SRMA would enhance the portion of Butterfield Trail that travels through it. A no surface occupancy stipulation for fluid mineral leasing would reduce soil erosion and surface disturbance to the Trail. The VRM Class I designation would maintain the natural and historic scenery.

Lands and Realty: ROWs would be avoided ½-mile each side of the historic trails, preserving the visitor experience and historic character to a greater degree than under Alternative A. ROWs would be excluded ½-mile each side of the Lake Valley Backcountry Byway, which would reduce visual intrusions and enhance the visitor's experience compared to Alternative A.

A 5-mile ROW exclusion area on either side of the El Camino National Historic Trail would protect the historic and cultural resources on the trail. This exclusion area would prevent the development of solar and wind projects within 5 miles of the Trail, as well as transmission lines and communication towers.

4.2.1.2.2.3 Alternative C Impacts on Historic Trails and Byway

Comprehensive Trails and Travel Management: The impacts would be the same as those in Alternative B.

Recreation and Visitor Services: The impacts would be the same as those in Alternative B.

Lands and Realty: Impacts of the avoidance area either side of the historic trails would be the same as under Alternative B. Impacts of the exclusion area either side of the Lake Valley Backcountry Byway would also be the same as under Alternative B.

Transmission lines would be avoided 5 miles either side of the El Camino National Historic Trail, making Alternative C less protective of historic and scenic resources than Alternative B. Other ROWs that meet VRM II objectives would be permitted within 5 miles; however, surface disturbance would not be permitted within ½-mile each side of the Trail, which would preserve its integrity.

4.2.1.2.2.4 Alternative D Impacts on Historic Trails and Byway

Comprehensive Trails and Travel Management: Impacts would be the same as those in Alternative B.

Recreation and Visitor Services: Impacts would be the same as those in Alternative B.

Lands and Realty: Impacts to the historic trails and the Lake Valley Backcountry Byway would be the same as those under Alternative A.

4.2.1.3 Impacts on Wilderness Study Areas

This section addresses impacts on wilderness characteristics within designated WSAs. These characteristics include size, naturalness, and outstanding opportunities for primitive recreation or solitude. Impacts could include actions that maintain, protect, or improve wilderness characteristics or actions that result in the complete or partial loss of these characteristics. Within each wilderness study area, the following variables determine the magnitude and intensity of impacts: the size and configuration of the area, topography, and vegetation land cover type. The analysis is based on the following assumptions:

- The entire area managed as a WSA contains naturalness and outstanding opportunities for solitude or for primitive, unconfined types of recreation.

- Uses and activities occurring outside a WSA could influence the wilderness values, though such influences would generally be indirect.
- WSAs in the *Planning Area* would continue to be managed in accordance with the WSA guidance in BLM's *Management of Wilderness Study Areas Manual (2012)* until Congress either designates or releases all or portions of the WSAs from further consideration.

4.2.1.3.1 Impacts on WSAs Common to All Alternatives

The existing WSAs would remain the same in size and number under all alternatives. All WSAs will be designated and managed as VRM Class I areas. Management of WSAs is governed by the *Management of Wilderness Study Areas Manual* (2012), which determines what actions are acceptable or not. Consequently, impacts of the alternatives would be expected to be the same for all alternatives. The Manual states . . . "*The BLM's management policy is to continue resource uses on lands designated as WSAs in a manner that maintains the area's suitability for preservation as wilderness. The BLM's policy will protect the wilderness characteristics of all WSAs in the same or better condition than they were on October 21, 1976".*

Retaining public land within existing WSAs and pursuing land acquisitions from willing sellers would help to maintain and could directly increase protection of wilderness characteristic within WSAs by eliminating any need to provide access to non-Federal inholdings and eliminating the possibility or management on non-Federal lands that could impact wilderness values. Surface-disturbing activities could be reduced in areas where the WSA inholdings would be acquired by BLM and greater land management continuity across the WSA would be facilitated.

WSAs which are not designated as part of the National Wilderness Preservation System by Congress and are released from further study would be managed according to the management prescriptions for non-wilderness lands immediately adjacent to the former WSA as prescribed in this RMP. In those cases where an ACEC designation overlaps a WSA (Table 4-2), the ACEC portion would be managed according to the prescriptions to protect the relevant and important values for which the ACEC was designated (Table 2-4). These management prescriptions include (1) closing the ACEC to mineral exploration and development, (2) managing the ACEC as VRM Class I and II, (3) excluding the ACEC from new right-of-way actions except in existing utility corridors, and (4) limiting vehicle use in the ACEC to designated routes.

4.2.1.3.2 Impacts of the Alternatives on WSAs

4.2.1.3.2.1 Alternative A Impacts on WSAs

Under Alternative A, vehicle use would be allowed on routes within WSAs that existed at the time the area was designated a WSA. Allowing existing ways to continue to be used could result in damage to wilderness values and other resources. Where this is occurring, BLM would be obligated to close those routes and allow them to rehabilitate or to undertake active rehabilitation of the damaged areas. In the past, unauthorized ways and the extension of existing ways in the Robledo Mountains and other areas have been closed to prevent resource damage and to allow damage that had occurred to rehabilitate.

4.2.1.3.2.2 Alternative B Impacts on WSAs

Under Alternative B, all routes within all the WSAs would be closed to mechanized or motorized vehicles, approximately 164 miles. Cherry-stem roads would remain open since they are by definition outside the WSAs. Closing all routes to mechanical vehicles (including bicycles) would protect

wilderness values within the WSAs. Routes would naturally rehabilitate. In some cases, active obliteration of routes could occur in order to speed the rehabilitation and improve naturalness of the areas. The long-term impact would be improved naturalness and reduction of human imprints within the WSAs.

4.2.1.3.2.3 Alternative C Impacts on WSAs

Under Alternative C, vehicle use would be allowed on routes within WSAs that existed at the time the area was designated a WSA. Potential impacts to wilderness values would be greater than those under Alternative B. Where impacts occur, BLM would be obligated to close those routes and allow them to rehabilitate or to undertake active rehabilitation of damaged areas. Any impact to wilderness values could constrain Congressional action to designate these areas as wilderness.

4.2.1.3.2.4 Alternative D Impacts on WSAs

Under Alternative D, impacts would be the same as those described in Alternative C.

4.2.1.4 Impacts on Wild and Scenic Rivers

Five river segments totaling 3.6 miles were studied for eligibility. These segments were free-flowing and contained at least one river-related outstandingly remarkable value (ORV) (see Appendix P). A tentative classification was given to these river segments. If a segment were determined to be suitable, the Las Cruces District Office would manage for the protection of their tentative classification, outstandingly remarkable values, and free-flowing nature until such time that Congress or the Secretary of the Interior either designates the segment as part of the National Wild and Scenic Rivers System or removes it from consideration. If the segment is removed from consideration, it would be managed according to the underlying management provisions of the RMP.

4.2.1.4.1 Impacts on Wild and Scenic Rivers Common to All Alternative

The Wild and Scenic river designations change across the action alternatives, as such, there are no impacts considered common to all action alternatives.

4.2.1.4.2 Impacts of the Alternatives on Wild and Scenic Rivers

4.2.1.4.2.1 Alternative A Impacts on Wild and Scenic Rivers

Five segments of stream on Cuchillo Negro, Percha, Palomas, Three Rivers and Tularosa Creeks would continue to be managed for their riparian and aquatic values. Suitability for inclusion within the National Wild and Scenic River System (NWSRS) would be determined at a later date.

4.2.1.4.2.2 Alternative B Impacts on Wild and Scenic Rivers

Five segments of river on Cuchillo Negro, Percha, Palomas, Three Rivers and Tularosa Creek, for a total of 3.5 miles, would be determined suitable for inclusion in the National Wild and Scenic Rivers System and pursued for Congressional designation. Each segment would have a 0.5 mile corridor established (0.25 miles each side of the river) to apply management to maintain or enhance the ORVs. In accordance with BLM policy, this corridor would be managed so no action could harm the values for which the river segment is found eligible and suitable. In addition to the Wild and Scenic River corridor, four of these river segments would have protective management through ACEC or Critical Habitat designations.

Cuchillo Negro Creek occurs within Recovery Unit 8 of Chiricahua leopard frog Critical Habitat (USFWS 2012). Three Rivers is within an existing ACEC. Percha and Tularosa are within proposed ACECs in this EIS. Palomas Creek is within a right-of-way avoidance area.

The ACEC broad management objectives seek to preserve biological resources (including riparian systems) and protect geological resources. The ACEC also restricts recreational visits to the fall and winter seasons, making recreational use more manageable along this segment of river; all of which is in concert with Wild and Scenic River management. In both cases, the protection provided by a Wild and Scenic River designation would only add minimal protection beyond that achieved through attainment of a Federal water allocation.

4.2.1.4.2.3 Alternative C Impacts on Wild and Scenic Rivers

The rivers would not be considered suitable for inclusion in the National Wild and Scenic Rivers System. All eligible river segments would receive protection through ACECs and Critical Habitat. The outstandingly remarkable values, free-flowing nature and tentative classification of these very short stream segments would be protected under current and proposed special designations.

4.2.1.4.2.4 Alternative D Impacts on Wild and Scenic Rivers

Only Tularosa Creek stream segment (1.4 miles) would be suitable and recommended for Congressional designation in the NWSRS. Impacts for Tularosa Creek would be the same as described in Alternative B.

4.2.2 IMPACTS ON LANDS WITH WILDERNESS CHARACTERISTICS (LWCs)

4.2.2.1 Impacts on LWCs Common to All Alternatives

Four areas, Bar Canyon, Peña Blanca South and Peña Blanca North in the Organ Mountains and Nutt Grasslands in southern Sierra County, were found outside existing WSAs to have wilderness characteristics. Closing the areas to commercial or industrial development, limiting vehicle use to designated routes, closing to new ROWs, and closing to locatable minerals and mineral material sales would prevent surface disturbance and maintain naturalness, and preserve the solitude of the areas.

4.2.2.2 Impacts of the Alternatives on LWCs

4.2.2.2.1 Alternative A Impacts on LWCs

Under Alternative A, no areas would be managed for lands with wilderness characteristics within the *Planning Area* since there have been no previously identified or managed lands with wilderness characteristics. However, since the Mimbres RMP (1993) and the White Sands RMP (1986), several areas have been identified as having wilderness characteristics and there are other areas within the *Planning Area* with potential wilderness characteristics not yet identified.

This means that the Nutt Grasslands, Bar Canyon, Peña Blanca South and Peña Blanca North would not be managed to protect those characteristics. The Nutt Grasslands have moderate to high potential for both solar energy and wind energy (US DOE 2003). Solar and wind development in the Nutt Grasslands would impact the physical aspects of wilderness values such as size and naturalness, and opportunities for

solitude or primitive recreation. All wilderness values identified (and areas that have not yet been identified) in the *Planning Area* could be potentially adversely affected by incompatible uses.

4.2.2.2.2 Alternative B Impacts on LWCs

Under Alternative B, all areas would be identified as LWC and would be managed to protect those characteristics. This would provide long-term protection for area size, naturalness, and solitude or primitive recreation in the four areas. Bar Canyon is only 423 acres in size but is contiguous to the Peña Blanca WSA and would complement the wilderness values of that WSA. Peña Blanca South is only 260 acres in size but is contiguous to the Peña Blanca WSA and would complement the wilderness values of the WSA. Peña Blanca North is only 120 acres in size but is contiguous to the Peña Blanca WSA and would complement the wilderness values of the WSA. By protecting the wilderness characteristics, Bar Canyon, Peña Blanca South and Peña Blanca North would likely be included in any Congressional designation or other protective management for the Organ Mountains and associated WSAs.

While identifying and managing the Nutt Grasslands as LWC would provide protection to those wilderness characteristics, it is questionable that this management could be maintained in the long-term. The land ownership configuration is intricate, with state trust and private parcels disrupting the continuity of the BLM land. The parcel is very nearly cut in half from east-to-west by some 4 miles of state trust land. Managing wilderness characteristics under this situation would be time consuming, and expensive.

Nutt Grasslands, Bar Canyon, Peña Blanca South and Peña Blanca North would be closed to mineral material sales, and fluid mineral leasing would be deferred in the short-term; therefore, there would be no impact from these activities. All four areas would continue to be open to locatable mineral entry. Location and development of mining claims is not likely in the Nutt Grasslands because it has no known potential for hard rock minerals.

Managing 423 acres of Bar Canyon, 260 acres of Peña Blanca South and 160 acres of Peña Blanca North as exclusion areas for land use authorizations and withdrawn from locatable mineral entry would reduce surface disturbance and help maintain naturalness, solitude, and opportunities for primitive or unconfined recreation in the long-term, making it suitable for inclusion in any special designation in the Organ Mountains. As a designated right-of-way exclusion area, wind and solar energy projects would be precluded; therefore, there would be no impacts from these activities.

4.2.2.2.3 Alternative C Impacts on LWCs

Under Alternative C, approximately 756 acres including Nutt Mountain itself would be designated an ACEC to protect scenic and ecological resources. While the surrounding grasslands would have the wilderness characteristics described in Alternative B, they would not be managed to retain that character. However, the area would be a right-of-way exclusion area under this alternative, precluding major rights-of-way projects. Other projects such as range improvements could have a detrimental effect on wilderness characteristics of the Nutt Grasslands, and these characteristics would not likely be maintained over time. In addition, the configuration of the land status would make the existing wilderness characteristics difficult to manage as described in Alternative B above.

Bar Canyon, Peña Blanca South and Peña Blanca North would be managed to preserve their wilderness characteristics pending any future protective designation for the Organ Mountains. Impacts would be the same as those described in Alternative B.

4.2.2.2.4 Alternative D Impacts on LWCs

Under this alternative, the Nutt Grasslands would not be managed to maintain its wilderness characteristics. However the area would be an avoidance area for major rights-of-way including wind energy projects. The impacts of this management would be the same as those described under Alternative C and impacts would include Nutt Mountain since it would not be designated an ACEC.

Bar Canyon would be managed to preserve its wilderness characteristics. Peña Blanca South and Peña Blanca North would not be managed to maintain their wilderness characteristics. Both areas would be open to locatable mineral entry. It is likely that some mineral prospecting would occur in Peña Blanca South and Peña Blanca North since it is part of the Organ Mining District which was active up until the mid-20th century. Prospecting activity could reduce the area's naturalness and preclude it being designated wilderness in the future. In the long-term, wilderness characteristics could be lost.

4.3 IMPACTS ON RESOURCES

4.3.1 IMPACTS ON AIR RESOURCES

4.3.1.1 Impacts on Air Quality

Impacts on air quality management are generally the result of activities that affect vegetation cover, alter the level of soil exposure across the *Planning Area*, and use fuel combustion sources. In the *Planning Area*, there are only ambient air quality monitoring stations in Doña Ana County, no stations are located in Otero or Sierra Counties. Furthermore, data regarding the extent and nature of surface-disturbing activities, number of motorized vehicles used daily, number of miles driven by these vehicles is not available. Consequently, air quality impacts for specific, planned actions are evaluated qualitatively (e.g., "*greater than*" or "*less than*") relative to current or historical conditions.

The method used in this air quality analysis is to review proposed resource management planning elements, describe the relative changes in emissions, and indicate the extent of potential impacts, where possible. These impacts are assessed for the different alternatives to ensure that the overall goal of managing surface-disturbing activities to maintain air quality consistent with National Ambient Air Quality Standards (NAAQS) and New Mexico Ambient Air Quality Standards is attained.

4.3.1.2 Impacts on Air Quality Common to All Alternatives

Management actions that restrict surface disturbance, restore habitats, or enhance public land health could indirectly help maintain or improve air quality because the generation of pollutant emissions, including particulates, would be restricted or limited. The degree to which air quality would be protected or improved would depend on the extent of the restrictions and limitations.

Impacts from fire management practices depend on the geographic extent and duration of direct air quality impacts resulting from both prescribed fire management burns and wildfires and the meteorological conditions during the burn. Typically, it is preferable to perform prescribed burns during periods of good ventilation to promote smoke dispersion. Areas receiving vegetation treatment would add short-term increases in particulate matter until vegetation recovers sufficiently to stabilize soil. After a fire, indirect air quality impacts can occur from windborne entrainment of dust from unvegetated areas. Use of prescribed fires for restoration would create smoke (particulate matter), CO, and greenhouse gases and would produce reactive hydrocarbons and minor amounts of SO_2 and NOx.

The recreational use of OHVs, including all-terrain vehicles and off-highway motorcycles, would cause fugitive dust emissions of particulate matter from traffic on unpaved trails and vehicular exhausts of carbon monoxide (CO), nitrogen oxides (NOx), and hydrocarbons. Motorized recreation and other use of motorized vehicles would generate tailpipe emissions and dust by travel on unpaved and paved roads. Construction activities, mineral material extraction, mining, and road maintenance would result in localized impacts on air quality. The potential air quality impacts associated with a particular proposed action would have to be assessed and disclosed during subsequent analyses.

4.3.1.3 Impacts of the Alternatives on Air Resources

4.3.1.3.1 Alternative A Impacts on Air Quality

Vegetation and Woodlands: The use of prescribed burning, prescribed wildfire, and grazing management to manage vegetation would prevent significant degradation of air quality.

Comprehensive Trails and Travel Management: Managing 1.64 million acres as open to cross-country OHV use could result in temporary, localized impacts on air quality from fugitive dust and emission of carbon monoxide (CO) and volatile organic compounds (VOCs). OHVs emit higher levels of air pollution than do automobiles. An all-terrain vehicle with a four-stroke engine emits approximately 7.5 times more air pollution than automobiles, and exhaust from an off-road motorcycle contains an estimated 12 times more compared to a typical automobile (BLM 2009). However, the largest OHV impacts are likely to be from dust generation. Limiting OHV use during fire season or during high wind events when dust creation would be greatest could be implemented as mitigation to reduce impacts on air quality.

Renewable Energy: Use of wind and solar facilities to generate electricity would incrementally reduce carbon and particulate emissions that would otherwise be released from fossil fuel power plants. Potential impacts on ambient air quality from solar energy projects would mostly likely occur during the construction phase. Vegetation would be cleared from large areas (up to several thousand acres) and impacts from fugitive dust emissions resulting from soil disturbances would be likely, but of short duration. During the operations phase, only a few sources with generally low levels of emissions would exist for any of the four types of solar technologies that might be implemented. Impacts on air quality from wind energy project construction would be less than those associated with solar energy projects since vegetation and soil removal would only occur for access road construction and tower location only.

Minerals: Withdrawing 71,000 acres from locatable mineral entry would further restrict surface disturbance and have a small positive impact on air quality in localized areas. Managing 3,852,382 acres as open to fluid mineral leasing with No Surface Occupancy (NSO), CSU stipulations or Standard Lease Terms and Conditions would likely have a relatively small impact on air quality because the area has relatively few wells being drilled. No more than 40 wildcat exploration wells would be expected to be developed over the 20-year lifetime of the RMP. No transmission pipelines, compressor facilities, bulk storage facilities or associated equipment would be needed. Consequently, minimal impacts from carbon monoxide (CO) nitrogen oxides (NO_x), sulfur dioxide (SO_2), volatile organic compounds (VOCs) or hazardous air pollutants (HAPs) would occur and greenhouse gas emissions would be negligible.

4.3.1.3.2 Alternative B Impacts on Air Quality

Vegetation and Woodlands: Restricting restoration to passive methods could increase the long-term risk of wildfires in woodland areas and indirectly cause short-term impacts on air quality compared to Alternative A.

Comprehensive Trails and Travel Management: Reducing the area managed as open to OHV use to 39,000 acres would be a major reduction of potential impacts on air quality from fugitive dust relative to Alternative A.

Renewable Energy: Impacts from solar energy project development would be the same as those described under Alternative A; however; impacts would be confined to the vicinity of the Afton Solar Energy Zone (SEZ), since this would be the only area open to solar energy project location under Alternative B. Impacts from wind energy would be the same as those described under Alternative A and could occur in localized areas throughout the *Decision Area*. However, ROW avoidance and exclusion areas combined would be increased to almost 800,000 acres which would further limit locations.

Minerals: Mineral material extraction and processing would have an impact on air quality in local areas because of fugitive dust emissions. This would be most noticeable and disagreeable near urban areas such as the Las Cruces wildland-urban interface. Impacts from dust could be mitigated by keeping the material being processed moist to prevent dust being generated. Closing 705,000 acres to mineral material disposal within WSAs, ACECs and other designations would have a local impact in preventing new dust emissions by preventing surface disturbance from extraction and processing.

Managing 333,200 acres as closed to fluid mineral leasing, and deferring new oil and gas leasing on the remainder of the *Planning Area* would preclude any impacts to air quality from these activities in the short-term. This would restrict surface-disturbing activities which could indirectly help retain existing air quality and visibility. However, existing leases could be developed, which would likely result in only minor impacts to air quality because of a low to moderate potential for oil and gas in the *Decision Area*. Impacts from exploration, drilling, development and utilization of geothermal leases would be related to fugitive dust emissions, vehicle and engine exhaust, and release of geothermal fluid vapor.

4.3.1.3.3 Alternative C (Preferred Alternative) Impacts on Air Quality

Vegetation and Woodlands: Utilizing both active and passive methods for vegetation management would enhance the BLM's ability to manage risk of wildfires, which cause short-term degradation of air quality compared to Alternative B. Active and passive methods provide flexibility in determining which technique to utilize to avoid degradation of air quality, given prevailing climate conditions.

Comprehensive Trails and Travel Management: Reducing the area managed as open to OHV use to 42,000 acres would be a major reduction of potential impacts on air quality from fugitive dust relative to Alternative A.

Renewable Energy: Potential impacts on ambient air quality associated with construction and operation phases of solar energy projects would be similar to those described under Alternative A but on a reduced geographic scale. The priority for solar projects would be the Afton SEZ and the majority of impacts would occur in its vicinity. Impacts on air quality from wind energy project construction would be the same as Alternative B. Use of wind and solar facilities to generate electricity would incrementally displace carbon and particulate emissions that would otherwise be released from fossil fuel power plants.

Minerals: Impacts from fluid mineral leasing management would essentially be the same as Alternative B. Closing 642,000 acres to mineral material sales would have a local minimal beneficial impact in preventing new dust emissions.

4.3.1.3.4 Alternative D Impacts on Air Quality

Vegetation and Woodlands: Impacts from prescribed fire would be the same as those described under Alternative C, except that using only active methods could indirectly increase localized impacts on air quality from fugitive dust and tailpipe emissions relative to Alternatives A, B, and C. This could result in localized short- and long-term impacts on air quality, depending on how long areas would take to reestablish.

Comprehensive Trails and Travel Management: Actions and impacts relating to OHV management would be the same as those described under Alternative C.

Renewable Energy: Impacts on air quality from renewable energy projects would be essentially the same as under Alternative C. The Afton SEZ would be the priority for solar energy project siting and avoidance and exclusion areas would be about 12,000 acres greater than under Alternative C because of the larger number of SRMAs and ERMAs where locations would be restricted under Alternative D.

Minerals: Impacts from fluid mineral leasing management for oil and gas would be the same as Alternative B. Geothermal leasing impacts would be the same as Alternative A.

4.3.1.4 Impacts on Greenhouse Gas Emissions

Sources of greenhouse gases on public land may include activities associated with minerals development; OHV use; management access; and other related vehicular activity to and from BLM-administered land. Where potential impacts on greenhouse gas emissions from management actions can be distinguished among the alternatives, a qualitative discussion has been included. Based on literature, quantitative estimates are given for potential carbon sequestration as a result of grassland restoration.

4.3.1.5 Impacts on Greenhouse Gas Emissions Common to all Alternatives

Use of vehicles on public land, resulting in emissions of CO_2, methane (CH_4), and nitrous oxide (N_2O), contribute incrementally to greenhouse gases. Alternatively, projects to restore grasslands and shrublands increase the land's ability to sequester CO_2. Restoring degraded land or land with low productivity increases carbon inputs and carbon sequestration. Sustainable grazing management can increase carbon inputs and stocks without necessarily reducing forage production (Conant, 2010).

4.3.1.6 Impacts of the Alternatives on Greenhouse Gas Emissions

4.3.1.6.1 Alternative A Impacts on Greenhouse Gas Emissions

Vegetation and Woodlands: Since the Restore New Mexico Program began in 2005, the Las Cruces District has completed an average of 72,400 acres of vegetation restoration projects each year. Studies indicate that restored rangelands can increase carbon sequestration. R. Lal (2004) noted that "*Observed rates of SOC (soil organic carbon) sequestration in agricultural and restored ecosystems depend on soil texture, profile characteristics, and climate, and range from 0 to 150 kg C/ha (hectare or 2.4 acres) per year in dry and warm regions."* Continuing the vegetation restoration program would contribute incrementally and in local areas to increasing carbon sequestration in the long-term.

4.3.1.6.2 Alternative B Impacts on Greenhouse Gas Emission

Vegetation and Woodlands: Improved grazing management that increases production leads to an increase of soil carbon stocks by an average of 0.35 Mg C ha^{-1} yr^{-1} (Conant, Paustian and Elliott, 2001). However, using only passive management techniques for grassland restoration would likely require a much longer time to achieve the results that could be more quickly achieved using both mechanical and passive methods. Carbon sequestration would be reduced under this alternative as compared to Alternative A.

4.3.1.6.3 Alternative C Impacts on Greenhouse Gas Emissions

Vegetation and Woodlands: Impacts of vegetation restoration projects on greenhouse gas emissions would be similar to those under Alternative A, depending on the amount of active restoration projects.

4.3.1.6.4 Alternative D Impacts on Greenhouse Gas Emissions

Vegetation and Woodlands: Impacts of vegetation restoration projects on greenhouse gas emissions would be the same or similar to those under Alternative C, depending on the amount of active vegetation restoration projects. Using primarily active methods of vegetation restoration would increase the rate of vegetation conversion and could increase the rate of carbon sequestration accordingly.

4.3.2 IMPACTS ON SOIL AND WATER

The analysis of impacts on Soil and Water was based on the following assumptions:

- Soil resources would be managed to meet *New Mexico Standards for Public Land Health and Guidelines for Livestock Grazing Management* (*New Mexico Standards and Guidelines*).
- Soils would be managed to minimize erosion and maintain soil productivity. BMPs listed in Appendix D would apply to all surface-disturbing activities.
- Surface disturbance of soil, including compaction of soil or loss of vegetation cover, might increase water runoff and downstream sediment loads and lower soil productivity, thereby degrading water quality, altering channel structure, affecting fisheries, and affecting overall watershed health.
- The degree of impact attributed to any one disturbance or series of disturbances would be influenced by several factors, including location within the watershed, time and degree of disturbance, existing vegetation, and precipitation.
- An increase of pollutants in surface water or groundwater would affect other uses (e.g., livestock watering, irrigation, or drinking water, aquatic and riparian obligate flora and fauna.

Impacts on soil and surface water resources would occur from surface disturbance associated with trails and travel management, vegetation, fire, minerals, livestock, wildlife, rangeland improvements, and recreation management actions. Although management actions would be designed to minimize impacts, BMPs and other site-specific protection measures would be implemented. In the long-term, mitigation measures could increase soil productivity and improve water resources. Management actions that restrict or prohibit surface disturbance would help maintain soil and water conditions.

Impacts to groundwater resources would be exploration for and development of fluid minerals, or groundwater pumping for community use. The Salt Basin Aquifer underlies the Otero Mesa which is also an area of interest for oil and gas leasing and development, as well as extraction of rare earth elements. Any fluid mineral leasing on Otero Mesa would require a determination of impacts on the Salt Basin

aquifer. The Salt Basin covers about 2,400 square miles of south-central New Mexico and extends into Texas. As much as 57 million acre-feet of groundwater may be stored within the New Mexico part of the Salt Basin and as much as 15 million acre-feet may be both recoverable and potable. However, much more information is needed to assess the full impacts of a drilling program in the area (Huff, G.F., and Chace, D.A., 2006). This type of information would be analyzed in the future programmatic EIS for oil and gas leasing in the District as well as in any NEPA document for an Application for Permit to Drill for an existing lease. New oil and gas leasing of Otero Mesa and the rest of the *Decision Area* would be deferred until that time, but development of existing oil and gas leases could occur.

4.3.2.1 Impacts on Soil and Water Common to All Alternatives

Long-term use of specific areas for recreation activities such as SRMAs and other designated routes may lead to an increase in localized surface disturbance and erosion, but may reduce the overall extent of impacts on soil and water resources within the *Decision Area*. Cultural and paleontological resource management actions would have localized effects on soil and water resources from surface disturbance if excavation is required. Localized removal of plant cover compaction of some soil types and resultant lower infiltration rates of those soils could occur in areas of livestock concentration and trailing.

Management actions associated with fish and wildlife habitat, special status species habitat, ACECs, and WSAs would restrict surface-disturbing activities and maintain vegetation resource conditions. Recommending areas for withdrawal from mineral entry as in ACEC management would also reduce surface disturbance and help maintain existing soil and water resource conditions over the long-term. Short-term vegetation restoration and fire management activities initially could cause soil disturbance, but in the long-term improve soil and water resources. Vegetation restoration projects have been shown to increase production, ground cover, and litter. These all serve to protect soil by reducing raindrop impacts and sheet erosion. Prescribed burning and wildland fire use could cause short-term soil erosion and sedimentation due to the loss of vegetation cover, but could increase the native plant community and organic soil matter and productivity in the long-term. These activities indirectly help maintain or improve soil and water resource conditions by reducing erosion and sedimentation.

Short-term vegetation loss and soil disturbance would occur with noxious weed and invasive species eradication but controlling these species would allow native species to grow and indirectly improve soil and water resources.

Development of rights-of-way for utilities and mineral exploration and development, removes vegetation, displaces soil, and increases soil compaction. These impacts could create new water-flow paths and channels, as well as reduce water infiltration. Decreases in vegetation through crushing and soil compaction and through the loss of soil crusts reduce the stabilizing characteristics of soil. Under these conditions, wind can move soil particles, which increases wind erosion, increases sedimentation, and degrades water quality.

Development of solar energy projects in the Afton SEZ would result in ground-disturbing activities (e.g., grading, excavating, and drilling), during the construction phase of a solar project. Resulting impacts would include soil compaction, soil horizon mixing, soil erosion and deposition by wind, soil erosion in water courses as well as surface runoff, sedimentation, and soil contamination. Altered groundwater recharge and discharge processes would also be expected. The Afton SEZ contains ephemeral wash features, intermittent pond/lake features, and areas within the 100-year floodplain. These areas are susceptible to increased erosion and sedimentation. Impacts to water would be minimal because the Solar EIS (USDI BLM 2011) restricts solar development to photovoltaic panels.

Managing livestock grazing according to *New Mexico Standards and Guides* would help to meet soil resource objectives and reduce soil erosion. Adhering to the grazing guidelines and managing to maintain or make progress toward the standards would help maintain or improve existing soil and water conditions by maintaining an herbaceous groundcover. Closing areas that are not within a livestock grazing allotment could help maintain existing vegetation states and soil and water resource conditions.

Mineral exploration and development would result in soil exposure, loss of vegetation from disturbance, compaction from vehicle traffic, increased erosion, higher rates of sedimentation, and permanent loss of resources. These activities would result in site-specific impacts on soil resources through removal of vegetation and topsoil during development activities (e.g., well pad construction) and through surface disturbance while constructing roads or pipelines or during exploration. Applying controlled surface use and other stipulations to oil and gas exploration and development activities would minimize soil erosion resulting from surface-disturbing activities.

Geothermal leasing and subsequent exploration, drilling, development, and utilization would continue to occur under all alternatives. Spent geothermal fluids are usually injected back into the geothermal source. In some cases fluid may be evaporated from lagoons or discharged to surface water, depending on the relative water quality and temperature. Geothermal water can contain a variety of dissolved compounds, including silica, sulfates, carbonates, metals, and halides. Any mixing of geothermal fluids with surface or groundwater where the chemical and thermal qualities of the geothermal fluids would degrade the other water in the area would potentially damage aquatic ecosystems and contaminate drinking water supplies. Impacts are not likely to occur due to the small number of perennial streams in the *Planning Area*. Impacts to soils would result from building access roads, clearing drill pads, and other surface disturbing activity. As a result of such clearing, soil would be susceptible to wind and water erosion.

4.3.2.2 Impacts of the Alternatives on Soil and Water

4.3.2.2.1 Alternative A Impacts on Soil and Water

Special Designations: Limiting surface disturbances in WSAs and ACECs would help to maintain soils and reduce erosion within these areas. A total of 90,000 would continue to be managed as ACECs under Alternative A. The management prescriptions would protect existing soil and water resources by prohibiting certain surface-disturbing activities. Management actions such as closing the area to fluid minerals leasing, limiting vehicle use to designated routes, and closing to mineral material sales would increase soil stability and productivity over time. Limiting surface disturbance near El Camino Real de Adentro National Historic Trail, Lake Valley Back Country Byway, Butterfield Overland trail, and the Mormon Battalion trail could maintain existing soil and water resources.

Vegetation and Woodlands: Implementing vegetation treatment methods such as wildland fire use, prescribed burning, and mechanical treatments could cause short-term surface disturbance, but long-term would improve vegetation conditions, increase litter, reduce soil exposure and erosion and improve or restore watersheds. Critical soils on 0 to 10 percent slopes would receive land treatments and stabilize.

Comprehensive Trails and Travel Management: Managing 1.64 million acres as open to cross-country OHV use would result in surface disturbance, damage to vegetation, and reduced soil stability and productivity, all leading to erosion and degradation of soil resources. Limiting OHV use to designated and existing routes on approximately 1.15 million acres in Doña Ana County would reduce the extent of impacts on soil and water. Closing 43,000 acres in Doña Ana County and 84 miles of routes to OHV use could maintain existing soil resources and indirectly reduce surface disturbance in these areas.

Fish and Wildlife Habitat: Protecting riparian habitat along Percha Creek and Tularosa Creek could limit surface disturbance and damage to vegetation in this area, providing the potential to improve soil productivity and watershed conditions over time.

Recreation and Visitor Services: Managing 69,000 acres as SRMAs in the *Decision Area* could allow BLM to manage and monitor recreation activities more effectively. Impacts on soil and water could vary depending on the recreation activities that would be allowed in a SRMA. Long-term recreation activities could lead to an increase in localized surface disturbance and erosion but may reduce the overall extent of impacts on soil and water resources. OHV use could be allowed in areas that would avoid sensitive and important plant, riparian, and wildlife habitat, which would indirectly maintain existing soil and water conditions and improve soil productivity in these areas over the long-term.

Livestock Grazing: Altering livestock forage use on a case by case basis would slowly improve vegetation condition and reduce soil erosion in the long-term. However, improved conditions are not anticipated in areas with no restoration potential (see Table 3-15). Grazing management on soils on 0 to 10 percent slope would stabilize those soils.

Lands and Realty: Impacts of development (e.g., removal of vegetation, soil extraction, installation of facilities) would be localized but could be long-term, depending on use of the resource. The need for access roads and transmission pipelines would also depend on the use to which the resource is being put, and could result in more surface disturbance and exposure of bare soil.

Renewable Energy: All areas not designated avoidance or exclusion areas would be potentially available for utility-scale renewable energy projects, depending on location, terrain, and factors associated with solar incidence and wind reliability. Impacts on soil resources from either solar or wind energy project developments would occur mainly as a result of ground-disturbing activities (e.g. grading, excavation, and drilling). Areas would be cleared of vegetation for roads, tower footings, and installation of solar collectors resulting in exposing the underlying soil to wind and water erosion. The largest cleared areas would be for solar collector installation, hence a greater potential for erosion. These areas would not be re-vegetated during the life of the project; therefore, impacts would be long-term. Lack of vegetation would result in wind erosion and increase of particulate matter in the air in the vicinity of the project and off-site to a lesser extent. Wind erosion could be reduced by keeping bare areas moist to control dust. However, this would increase the use of ground water for the project.

Minerals: Almost 4 million acres of surface and subsurface mineral estate would be open to mineral material (sand, gravel, and building stone) disposal under this alternative. The extraction or exploration of locatable minerals would result in surface disturbance and the removal of vegetation in localized areas. This could lead to soil exposure and erosion and soil compaction could occur from vehicles or construction but impacts would be localized and scattered.

Managing 3,655,000 acres in the *Decision Area* as open to fluid-mineral leasing with standard lease terms and conditions would cause surface disturbance, soil compaction, and erosion. Impacts on soil and water would be less in Doña Ana County because fewer acres would be open to fluid minerals with standards lease terms and conditions. Fluid minerals exploration and development on areas open to leasing with standard terms and conditions would result in removal of vegetation and exposure of soil to wind and water erosion. This impact would be minimal, localized and short-term as no more than 40 wildcat wells would be expected to be drilled during the lifetime of this RMP, and none of these would be likely to become producing wells as the oil and gas potential is low to moderate throughout the *Planning Area*.

Geothermal leasing would be Open with stipulations on 3.19 million acres. The effects of leasing would be as described in Impacts Common to All Alternatives.

4.3.2.2.2 Alternative B Impacts on Soil and Water

Special Designations: Increasing acres designated as ACECs from 90,000 acres to 518,000 acres could result in less surface disturbance and greater protection of soil and water resources. Closing the Organ/Franklin Mountains and the Cornudas Mountains to OHV use would protect soil resources and improve soil stability and productivity over time.

Vegetation and Woodlands: The alternative to use only passive methods to enhance vegetation would decrease localized soil disturbance when compared to Alternative A, however, improvements to an ecological site would occur more slowly than with the use of both passive and active techniques. Restoring grasslands using passive methods could improve soil and water resources compared to Alternative A, but it could maintain existing conditions including localized areas of erosion. Improvement would take longer and may not be achieved during the life of the RMP. Restored grasslands would help improve watershed conditions however these affects could be less than Alternative A under which both active and passive techniques would be used.

Not authorizing vegetation sale area permits and prohibiting plant sales and plant collection in forest and woodland areas could decrease vegetation removal and reduce soil erosion in localized areas, and indirectly maintain soil and water resources to a greater extent than Alternative A.

Comprehensive Trails and Travel Management: Reducing the area managed as open to cross-country OHV use by 98 percent would reduce surface disturbance relative to Alternative A. Designating 259,110 acres and 346 miles of routes as closed to OHV would reduce surface disturbance compared to Alternative A, which designates only 43,000 acres and 84 miles as closed. In addition, closing or rerouting all vehicle routes in riparian areas and arroyo habitats would reduce vegetation damage and soil compaction and erosion and improve soil productivity over the long-term compared with Alternative A.

Designating all routes as closed in all WSAs (Appendix J) would reduce surface disturbance and, thus, maintain existing soil and water resources and improve soil conditions over time relative to Alternative A. Managing areas as limited to designated routes and limited to existing routes would have the same impacts as Alternative A. Existing trails would continue to be managed as limited to equestrian use and hiking only, which would have the same impacts as Alternative A.

Recreation and Visitor Services: Managing ERMAs that emphasize non-motorized uses and that occupy an area of 39,000 acres (an increase of 16 percent) would have the same types of impacts as Alternative A, but would incidentally preserve more soil and water resources. The larger area could better accommodate recreational demand and reduce the potential for wider surface disturbances to soil and water resources.

Fish and Wildlife Habitat: Vegetation increases as a result of restoration treatments would reduce soil erosion and soil evaporative losses and improve water infiltration across the *Planning Area*. Riparian enhancement would reduce potential water contaminants from reaching surface water flow.

Livestock Grazing: Reducing AUMs by 25 percent on lands with limited restoration would increase vegetation condition, and reduce soil erosion and improve water infiltration, within the capability of the site, in the long-term on 950,000 acres compared to Alternative A.

Lands and Realty: Not authorizing surface-disturbing activities within 303(d) listed watersheds and streams where sedimentation is an impairment could reduce damage to vegetation and maintain the existing soil structure. This helps maintain a greater extent of soil and water resource conditions compared to Alternative A. Alternative B would exclude the greatest extent from rights-of-ways, nearly

twice the acreage of Alternatives C and D. This would reduce the amount of surface disturbance from activities such as the development of roads or transmission lines.

Renewable Energy: The impacts of Alternative B decisions regarding wind and solar energy would concentrate surface disturbing activities into the least amount of area compared to the other alternatives. Only the Afton SEZ would be developed for solar, and 1,600,000 acres (57 percent) of the *Planning Area* would be wind energy avoidance or exclusion areas. Those areas open to solar and wind development would require the implementation of Best Management Practices (BMPs see Appendix D) to reduce disturbances to soil and water.

Minerals: All areas currently closed to fluid mineral leasing, 333,000 acres, would continue to be closed. In the remainder of the *Planning Area* oil and gas leasing would be deferred pending the preparation of a future programmatic RMP amendment and EIS for oil and gas leasing in the Las Cruces District. As a result, there would be no impacts to soil or water from oil and gas leasing. Existing leases could be developed which would result in minor impacts to soil because of the relatively small number of leases and a lack of production due to the low to moderate potential for oil and gas. Potential impacts to groundwater would be assessed during the NEPA analysis for the application for permit to drill (APD).

Managing locatable mineral resources would have the same impacts as Alternative A, except that protection of soil and water resources would occur over a larger area. Where allowed, mineral materials sales would have similar impacts as Alternative A.

Geothermal leasing would continue to occur on 3.15 million acres. Impacts to soil and water would be the same as those described under Impacts Common to All Alternatives, but more acreage would be closed to leasing than in Alternative A.

4.3.2.2.3 Alternative C (Preferred Alternative) Impacts on Soil and Water

Special Designations: Managing and designating 304,000 acres as ACECs would limit surface-disturbing activities but is 28 percent less acreage than Alternative B.

Vegetation and Woodlands: Impacts on soil and water resources from restoration are the same as Alternative B, except the use of passive and active restoration treatments could cause short-term, localized soil disturbance. Meeting site potential and achieving proper functioning condition (PFC) would help maintain or improve riparian systems and wetlands by improving resource conditions in adjacent uplands. Mitigating surface-disturbing activities that would result in soil movement and loss within watersheds with 303(d) listed streams, would help maintain soil structure and watershed conditions more rapidly than in Alternative B.

Fish and Wildlife Habitat: Impacts would be the same to soil and water resources as described in Alternative B.

Livestock Grazing: A watershed-based strategy would improve the BLM's ability to effectively adjust livestock forage use where ecosystem function warrants it, leading to an increase in improved soil and water conditions compared to Alternative A. Compared to Alternative B, this alternative enhances soil and water conditions in a variety of watersheds, whereas Alternative B only enhances conditions in sites with limited restoration potential.

Comprehensive Trails and Travel Management: Surface disturbance would be reduced compared to Alternative A but slightly increased compared to Alternative B. Limiting vehicles to existing or

designated routes to 2.71 million acres is a 60 percent increase over Alternative A but just slightly less than Alternative B.

Recreation and Visitor Services: Increasing the area managed as SRMAs and ERMAs to 151,309 acres could reduce surface disturbance in more areas, but could increase the area where localized surface disturbance occurs compared to Alternative A and B.

Lands and Realty: Reducing the area managed as exclusion (343,000 acres) for rights-of-way activities could allow surface-disturbing activities to occur over a larger area relative to Alternatives A and B. Increasing the width of the Anthony Gap designated utility corridor to 1.0 miles would extend the area available for new transmission lines, both pipelines and overhead electrical lines, and would have the same impacts as Alternative A but increase surface disturbance over a larger area than Alternative B.

Renewable Energy: Impacts of solar and wind energy on soil and water would be the same as those under Alternative B, however, under Alternative C, these solar projects would be considered over a much greater area. Solar and wind projects would be considered on 43 percent of the *Planning Area*.

Minerals: Impacts from oil and gas leasing and geothermal leasing would be the essentially the same as those described for Alternative B but 3.29 million acres would be Open for leasing with stipulations, which is greater than Alternative B but less than Alternative A.

4.3.2.2.4 Alternative D Impacts on Soil and Water

Special Designations: Impacts would be the same as Alternative A.

Vegetation and Woodlands: Managing soil, water, and vegetation resources using only active restoration methods could increase localized short-term surface disturbance compared with Alternatives A, B, and C. Active restoration in the long-term could increase soil productivity and stability, reduce erosion, and improve wildlife habitat, but it could result in fewer long-term improvements when compared to Alternatives A, B, and C. In the long-term, reaching PFCs would increase soil stability and hydrologic function resulting in the same impacts as Alternative D. Allowing surface-disturbing activities could result in increased soil erosion and sedimentation and reduce water quality relative to Alternatives B and C and could improve resource conditions relative to Alternative A.

Fish and Wildlife Habitat: Wildlife decisions under Alternative D would maintain or improve riparian habitat conditions which would enhance soil and water resource conditions in those watersheds.

Livestock Grazing: Impacts to soil and water would be the same as Alternative A.

Comprehensive Trails and Travel Management: Increasing the area managed as limited to existing or designated routes to 2.73 million acres could reduce surface disturbance relative to Alternative A. Surface disturbance compared with Alternatives B and C would be essentially the same.

Recreation and Visitor Services: The impacts of Alternative D recreation decisions are essentially the same as those described in Alternative C.

Lands and Realty: Increasing the width of the Anthony Gap utility corridor to 2 miles-wide increases the area where surface-disturbing activities could occur relative to Alternatives A, B and C.

Renewable Energy: Impacts of solar energy development on soil and water in the Afton SEZ and in areas outside the SEZ would be the same as those described under Alternatives B and C.

Minerals: Impacts from oil and gas leasing, and geothermal leasing, would be essentially the same as those described for Alternative B. Geothermal leasing would be Open with stipulations on 3.63 million acres, which is the greatest area of the alternatives.

4.3.3 IMPACTS ON VEGETATION AND WOODLANDS

This section analyzes management actions that could result in physical disturbance to vegetation communities or could restore vegetation to desired conditions. The following assumptions were used in the analysis of impacts on vegetation:

- Vegetation cover, composition, diversity, and density often progress through multiple states following a disturbance, with those characteristics becoming increasingly similar to reference plant communities (site potential) over time unless the disturbance pushed degradation passed a threshold that now resists ecologic recovery (site capability).
- Development of cover, diversity, and structure of plant communities similar to reference conditions following a disturbance would be from 10 to 100 years or more, depending on past, present, and future conditions.
- The degree of impact on a plant community attributed to any one disturbance or disturbances would be influenced by the characteristics both of the disturbance and the site. Relevant disturbance characteristics include size, shape, and connectedness to undisturbed areas; frequency, duration, and seasonality of disturbance; and severity and intensity of disturbance. Site characteristics include location in the watershed, existing vegetation, and land cover type.
- Adequate forage would be available to meet wildlife population objectives.
- All plant communities would be managed toward achieving a mix of native species composition, cover, diversity, and age classes.
- Noxious and invasive weeds would continue to be introduced and spread as a result of ongoing vehicle traffic, recreational activities, wildlife and livestock grazing and movement, and surface-disturbing activities.
- Weed and pest control would be carried out according to BLM's *Partners Against Weeds – An Action Plan for the Bureau of Land Management*, as well as in coordination with appropriate county weed and pest control districts and owners of adjacent properties.
- Climatic fluctuation would continue to influence plant community characteristics, including composition, diversity, structure and productivity.
- Impacts include direct and indirect impacts on species composition and structure, as well as changes to riparian and wetland functioning conditions.

Areas with limited restoration potential are unlikely to transition toward the desired state and conditions without additional inputs. However, disturbances in these areas could result in further degradation that leads to expansion of the degraded vegetation into adjacent communities. Increased disturbance in all the land cover types with limited restoration potential could result in increased rates of erosion or invasion from nonnative, invasive species.

Restoration activities or reduced surface disturbance may initiate succession that may lead to a transition toward a more desired plant community that is closer to the potential natural community of the ecological site. For example, shrub-scrub communities could transition to grassland-herbaceous vegetation through increased cover of herbaceous species resulting from restoration treatments or reduced disturbance.

4.3.3.1 Impacts on Vegetation and Woodlands Common to All Alternatives

Management of special designations helps retain existing vegetation and riparian resource conditions by restricting surface-disturbing activities. Where the plant community is in the desired state, special designations indirectly help to maintain these resource conditions. Provisions of special designations could alter the location, extent or method of restoration activities, which would reduce the areas ability to achieve the desired state in places with disturbed vegetation, invasive species, or noxious weeds.

The Fire Regime Condition Class on most treated landscapes would approach desired conditions and could reduce the occurrence of catastrophic fires, thereby helping to maintain desired vegetation states. Fire use would help increase vegetation diversity and resistance to disease and insect pest infestations. Mechanical treatments and prescribed fire would be used in woodlands and forest to reduce plant density, reduce ladder fuels and improve overall forest and woodland health. Fire, chemical and mechanical treatments would also be used to restore native species and to control invasive species and noxious weeds. Desired future vegetation conditions would be achieved over several decades.

Under all alternatives, vegetation treatments would be implemented which could transition vegetation communities towards a site's ecological capability or the potential natural community. This would result in long-term increases in vegetative cover, production, species enrichment, and soil water holding capability. Watershed rehabilitation projects would improve soil and site stabilization, watershed hydrologic function and vegetation ground cover.

Chemical treatments of vegetation would be applied so that edges of the treated vegetation unobtrusively blended in with the surrounding vegetation, so as not to draw the attention of the viewer. This would maintain a more natural appearance of the landscape without abrupt changes in vegetation dominance.

Habitat improvements for special status species and fish and wildlife through the development of HMPs, ACECs, and other habitat protections would maintain or improve vegetation. This could move vegetation communities in these areas toward ecological site potential or capability. Vegetation treatments would improve aplomado falcon habitat by stabilizing or increasing trend in desired plant community within the capability of the ecological sites. Wildlife management BMPs (Appendix D) would enhance key habitats as identified in the NMDGF *Comprehensive Wildlife Conservation Strategy for New Mexico*.

Removal of woodland and plant species such as fuel wood, Christmas trees, fence posts, piñon nuts, seeds, yuccas, and cactus species would have little effect on vegetation as a whole over the *Decision Area*. Removals would generally be limited in quantity, be in site-specific and localized areas, and associated with other projects such as vegetation restoration, fuels reduction, right-of-way project construction, Native American ceremonial use, and other similar actions.

Forage utilization by livestock would be governed by the *New Mexico Standards for Public Land Health and Guidelines for Livestock Grazing Management* (*New Mexico Standards and Guidelines)* and the latest scientific research. Grazing by livestock or wildlife can alter upland vegetation communities by removing portions of plants. The degree of alteration would depend on the extent of the removal, length of grazing period, and climatic conditions. Grazing animals' hooves could trample plants and compact soils in localized areas with concentrated use. Concentrated grazing can alter vegetation structure and species composition (Kimball and Schiffman 2003); however, managing livestock grazing according to *New Mexico Standards and Guidelines* would be aimed at eliminating the long-term impacts from livestock use, resulting in vegetation communities that are meeting or moving toward ecological site capability or potential. Restoring soil and water resources and prioritizing watersheds for assessment of *New Mexico Standards and Guidelines* could indirectly help maintain or restore vegetation communities.

Travel management planning would reduce impacts to vegetation that could otherwise result from cross-country travel. Unregulated off-road use would cease and any new roads would be developed only where existing roads or trails cannot be used or where off-road travel is not possible because of topography or terrain. Limiting vehicle use to existing or designated routes would reduce the amount of vegetation crushed or removed.

Impacts on vegetation resources from either solar or wind energy project developments would occur mainly as a result of ground-disturbing activities (e.g. grading, clearing, excavating, and drilling), during the construction phase. Lack of vegetation would result in wind erosion and increase of particulate matter in the air in the vicinity of the project and off-site to a small extent. Water erosion would also result during heavy rainstorms during the summer rainy season. Once construction is complete, cleared areas in most cases would not be allowed to re-vegetate as this could interfere with operation of the facilities.

Implementing watershed management and activity plans would reduce soil erosion and improve infiltration of precipitation, thus increasing cover, density, and productivity of vegetation in parts of the *Decision Area*. Fencing 280 acres along Percha Creek would help to protect valuable and important riparian vegetation in that area and help maintain the existing functioning condition.

Minor new facilities in recreation management areas (RMAs), such as toilets, kiosks, directional signs, and fire pits would cause a small but permanent loss of vegetation. Hardened surface facilities in the RMAs would also result in permanent loss of vegetation on a limited basis. However, the facilities infrastructure and concomitant educational programs such as *Tread Lightly* would result in a reduction in damage to vegetation that would be caused by dispersed camping, biking, road use, and horseback riding.

On some lands identified for disposal, the BLM would retain a restrictive easement preventing development in arroyos where vegetation would be retained for watershed function purposes. On other land identified for disposal, without easements, land use could be altered and vegetation removed for development or other purposes.

Rights-of-way (ROW) can permanently remove vegetation, e.g. roads. Buried utilities are re-vegetated so there is little net alteration of overall vegetative cover or diversity. ROW holders are subject to weed stipulations to reduce the likelihood invasive or noxious weeds.

Vegetation would be affected by geothermal leasing and development from direct destruction and removal, fugitive dust, exposure to contaminants, and the introduction of invasive species.

Closing 333,000 acres to fluid-mineral leasing and closing at least 353,000 acres to mineral material disposal would limit surface-disturbing activities. This indirectly helps to maintain the existing vegetation, reduces opportunities for the establishment of noxious weeds and invasive species, and sustains the current functioning conditions of riparian areas and wetlands.

4.3.3.2 Impacts of the Alternatives on Vegetation and Woodlands

4.3.3.2.1 Alternative A Impacts on Vegetation and Woodlands

Special Designations: The current special management designations such as WSAs, ACECs, and restricting surface disturbances along historic trails and other management practices would help to maintain existing vegetation or riparian habitats. Approximately 617,000 acres designated as VRM Class I and II would preserve existing states of vegetation as a result of reduced surface disturbance. However,

VRM Class I objectives could limit the types and location of allowable vegetation restoration methods. In these areas, special care to reduce sharp contrast could minimize impacts to the visual resource.

Soil and Water: Existing decisions from soil and water management would allow BLM to progress toward restoring ecosystems using herbicides, natural and prescribed fire, and grazing treatments on grass bottomlands, mixed desert shrub, snakeweed, and mountain brush. This would cause temporary disturbance of treated vegetation. Long-term impacts would include increased diversity, cover, and productivity of vegetation. Indirectly, this would decrease the cover or density of noxious weed and invasive plant species in treated areas.

Vegetation and Woodlands: The decisions for vegetation in Alternative A enhance management through the use of prescribed burning, grazing management, prescribed wildfire, and herbicides lead to increases in vegetation cover, productivity, and diversity. The prescription for at least two years of rest during the growing season increases vegetation vigor and productivity.

Livestock Grazing: Altering livestock forage use on a case by case basis would slowly improve vegetation condition in the long-term. However, improved conditions are not anticipated in areas with no restoration potential (see Table 3-15 for a list of these areas).

Comprehensive Trails and Travel Management: Managing 1.64 million acres as open to cross-country OHV use, including 76,000 acres identified as having restoration opportunities in Sierra and Otero counties, could result in widespread surface disturbance and removal of existing vegetation. Managing 272,000 acres as limited to designated routes and 880,000 acres managed as limited to existing routes could result in the removal of existing vegetation in areas adjacent to these routes. Managing the Red Sands and Aden Hills areas as open to OHV use would continue localized disturbance of vegetation on 42,000 acres. Closing 43,000 acres to OHV use in WSA and ACECs to vehicle use would help maintain existing vegetation.

Lands and Realty: Managing approximately 532,000 acres as right-of-way avoidance or exclusion areas, including 23,000 acres with restoration opportunities, would relocate surface-disturbing activities associated with rights-of-way to less sensitive areas. The designation of 17,613 acres as utility corridors would help to limit the placement of new facilities and utilities. The use of these corridors would reduce surface disturbance and facilitate the retention of riparian areas and existing plant communities outside the designated corridor. However, within the corridor there would be long-term localized disturbance as the result of siting electrical transmission line, fiber optic lines, hydrocarbon pipelines, or other utility lines.

By disposing of isolated and difficult-to-manage tracts, land exchanges and disposals would reduce fragmentation of BLM-administered land and improve BLM's ability to manage vegetation and other resources. Potential disposals would remove 213,199 acres from BLM's management. Potential acquisitions would bring 172,000 acres into BLM management, providing consistent management of high value resources on larger blocks of contiguous land.

Minerals: Managing approximately 3.65 million acres as open to fluid-mineral leasing with standard lease terms and conditions could result in localized surface disturbance from exploration and development activities. If applications for permits to drill (APD) are granted for leased areas, this could result in localized areas where vegetation would be removed in the short-term. In the long-term, reclamation and restoration would be required and could restore the desired vegetation communities; however, reclamation of oil and gas pads, roads, and rights-of-way have shown to be only marginally successful. Incomplete or unsuccessful reclamation could result with invasive species or barren areas, leaving a fragmented vegetation landscape and wildlife habitat.

Impacts from geothermal leasing and development would be potentially greatest under Alternative A since the largest amount of area would be open to leasing.

4.3.3.2.2 Alternative B Impacts on Vegetation and Woodlands

Special Designations: Restricting surface disturbance on 1.24 million acres in VRM Class I and Class II areas (primarily in WSAs, ACECs, and historic trails) could increase the potential to preserve vegetation on about 100 percent more land in comparison to Alternative A. By designating the Tularosa Creek and Percha Creek as ACECs, riparian/wetland vegetation would be maintained in two important areas. Increasing the distance where surface-disturbing activities are not allowed to ½-mile around the Butterfield Overland Trail, El Camino Real de Tierra Adentro, and the Mormon Battalion Trail could indirectly retain existing vegetation in these larger areas as compared to Alternative A.

Vegetation and Woodlands: Vegetation restoration would be limited to passive methods only. Use of prescribed fire, mechanical and chemical treatments would not be allowed. This would transition plant community characteristics toward desired conditions at a slower rate and with fewer short-term improvements. Passive restoration methods could result in vegetation communities in a degraded state not meeting desired condition, ecological site capability, or the potential natural state relative to Alternative A.

Allocating increases in forage production resulting from restoration treatments for watershed function and wildlife would result in increased cover and density of grass and herbaceous species. This would help maintain existing vegetation states or move vegetation toward the potential natural community or the site's ecological capability when compared with Alternative A. However, by using only passive methods for vegetation restoration, results would be achieved more slowly and as compared to Alternative A.

Livestock Grazing: Reducing AUMs by 25 percent in areas with limited restoration potential would improve vegetation condition within the capability of the site across 34 percent of the *Decision Area*.

Comprehensive Trails and Travel Management: Five travel management areas would be established, and areas open to cross-country OHV use would be reduced to 39,000 acres (a 98 percent reduction). In special designation areas, the area closed to OHV use would increase by about six times to 259,000 acres. The area managed as limited to existing routes would more than double to slightly less than 2.25 million acres. These changes to trails and travel management would greatly reduce the extent of widespread surface disturbance from motorized vehicle use relative to Alternative A. This could help degraded plant communities to recover and develop toward the ecological site capability in comparison to Alternative A.

Reducing the Aden Hills Open Area to 5,100 acres would limit opportunities to manage for intensive OHV use, but would counteract dispersed disturbance to vegetation elsewhere.

Lands and Realty: Designating 150,000 acres as a utility corridor is over eight times more land than Alternative A. This would provide greater control over utility development, which would reduce surface disturbance and indirectly help retain more of the diversity of existing vegetation and current functioning conditions of riparian/wetland areas outside the corridors. However, direct impacts to vegetation within corridors would be much greater than in Alternative A.

Managing 920,000 acres as avoidance or exclusion areas would maintain the potential for preservation of sensitive resources, including vegetation, from right-of-way development on about 1.8 times more land relative to Alternative A.

The amount of land identified for disposal would be less in comparison to Alternative A. More land would be retained in Federal ownership allowing for better management and retention of the vegetation on those parcels of land. However, identifying less land for land exchanges would mean that there would be less opportunity to acquire land with higher vegetation resource values such as intact grassland.

Renewable Energy: The construction of solar energy facilities within the Afton SEZ would result in direct impacts on plant communities due to the removal of vegetation within the facility. Up to 80 percent of the Afton SEZ, 24,000 acres would be expected to be cleared with full development. The plant communities affected would depend on facility locations, and could include any of the communities occurring on the SEZ. Confining development of solar energy projects to the Afton SEZ would protect the vegetation in the remainder of the *Decision Area* from impacts of solar development. Indirect effects offsite (caused, for example, by surface runoff or dust from the SEZ) have the potential to degrade affected plant communities and may reduce biodiversity by promoting the decline or elimination of species sensitive to disturbance. Indirect effects can also cause an increase in disturbance-tolerant species or invasive species.

Minerals: Compared to Alternative A, impact to vegetation from oil and gas leasing would be very low. Existing leases could be developed but impact would be minimal and local due to the small number and acreages of those leases. Existing WSAs and ACECs in the *Planning Area* would be closed to oil and gas leasing and leasing would be deferred in the remainder of *Planning Area* except on 57,705 acres with existing leases; therefore, there would be no impact in the short-term on 99.5 percent of the *Planning Area*.

4.3.3.2.3 Alternative C Impacts on Vegetation and Woodlands

Special Designations: Designations of VRM Class I and Class II of approximately 910,000 acres (primarily in WSAs, ACECs and along historic trails) would decrease the area where surface-disturbing activities could be restricted by 5 percent less than Alternative B. Overall, these decisions could help retain more vegetation in its existing condition compared with Alternative A. Management actions are expected to have the same impacts on riparian/wetland functioning conditions as Alternative B.

Vegetation and Woodlands: Impacts from restoration efforts for watersheds and vegetation would be similar to those under Alternative B, except restoration would use both active (mechanical, fire, and chemical treatments) and passive (altering resource use) methods. This would provide a more comprehensive restoration approach than Alternatives A or B. Greater short-term disturbance of vegetation could occur relative to Alternative B, but long-term restoration results could be attained sooner and over a larger area relative to Alternatives A or B. Woodland harvest to improve ecological conditions would help to restore herbaceous and grassland vegetation in areas being invaded by woody vegetation. This could increase the area where vegetation is meeting ecological site capability compared to Alternatives A and B.

Livestock Grazing: A watershed-based strategy would improve the BLM's ability to effectively adjust livestock forage use where ecosystem function warrants it, leading to an increase in improved vegetation conditions compared to Alternative A. Compared to Alternative B, this alternative enhances vegetation conditions in priority watersheds, whereas Alternative B only enhances conditions in sites with limited restoration potential.

Comprehensive Trails and Travel Management: The only areas open to cross-country OHV would be Aden Hills (8,052 acres) and Red Sands (33,854). These areas are dominated by sparsely vegetated scrub-shrublands. This would reduce by about 97 percent the area where cross-country motorized use is allowed relative to Alternative A, but is about 8 percent larger than Alternative B. In addition, the area

managed as limited to designated routes on 569,713 acres and the 2.2 million acres managed as limited to existing routes would reduce surface disturbance and benefit vegetation in an area about twice as large as Alternative A and about 10 percent less than Alternative B. Areas closed to OHV use would be reduced to 19,000 acres and 151 miles of routes would be closed. This could reduce surface disturbance compare to Alternative A and slightly increase surface disturbance compared to Alternative B.

Lands and Realty: In Alternative C, land managed as avoidance or exclusion would total 766,000 acres. This would allow for surface disturbance from right-of-way activities on about 17 percent more land in sensitive areas compared to Alternative B, but still preserves substantially more land from utilities development than Alternative A. Nearly three times as much land is available for disposal compared to Alternative B, and vegetation on these lands could be removed.

Renewable Energy: The impacts of solar energy facilities would be the same as Alternative B.

Minerals: Impacts from oil and gas leasing and development of existing leases would similar to those described for Alternative B. Impacts from geothermal leasing would be the same as those described in Alternative B.

4.3.3.2.4 Alternative D Impacts on Vegetation and Woodlands

Special Designations: Impacts would be the same as those described in Alternative A.

Vegetation and Woodlands: Limiting restoration to active methods (manual, fire, biological, chemical, and mechanical treatments) could require repeated treatments and could cause greater short-term disturbance to achieve resource goals and objectives. Using only active methods for restoration could limit the long-term success of restoration that would be achieved under Alternative C without implementing appropriate changes in resource use such as grazing. Also, this could result in a greater extent of vegetation in localized areas transitioning to a long-term degraded state compared to Alternative C, but would result in similar long-term effects compared to Alternative B. The speed with which an area would reach natural potential would be greatest under Alternative D and least under Alternative B.

Livestock Grazing: Livestock grazing impacts would be the same as those described under Alternative A

Comprehensive Trails and Travel Management: Under Alternative D, the area managed as limited to designated routes would be reduced to 277,336 acres and the area managed as limited to existing routes would include 2.5 million acres. Also, the coverage of closed routes would be reduced to 17,000 acres and 94 miles of routes. Overall, these decisions would slightly increase the extent for potential surface disturbance from OHV use relative to Alternative C. However, the overall impact of degrading vegetation from travel and trails and OHV use would be greatly reduced under this alternative in comparison to Alternative A. This reduction would be accomplished primarily by reducing the area of open acres of cross-country OHV use to only a small percentage of the *Decision Area*, a limitation that also is present in Alternatives B and C.

Red Sands and Aden Hills would be open to cross-country OHV use and would be managed the same as Alternative C. The impacts on vegetation would be the same as Alternative C.

Lands and Realty: Designation of 257,000 acres as a utility corridor would be about 10 percent larger than Alternative C and would increase the localized disturbance from utility development compared to all other alternatives. This also would require the most intensive management of vegetation in corridors with developed utilities.

Less land managed as exclusion (308,000 acres) and more land managed as avoidance areas (453,000) for rights-of-way, increases the area of surface disturbance compared to Alternatives B and C. This could help retain more existing vegetation in its current state compared with Alternative A, but it could result in degradation of vegetation compared with Alternatives B and C.

In comparison to Alternatives B and C, more land would be available for disposal. This could reduce fragmentation of BLM-administered land and improve BLM's ability to manage vegetation and other resources compared to Alternative A. Utility Corridor decisions in Alternative C would impact more vegetation because the north-south corridor along I-25 would be two miles wide, compared to one mile wide in Alternative B.

Renewable Energy: Impacts of solar development would be the same as those for Alternative B.

Minerals: Impacts from oil and gas leasing and development of existing leases would similar to those described for Alternative B. Impacts from geothermal leasing would be the same as those described for Alternative A.

4.3.4 IMPACTS ON FISH AND WILDLIFE HABITAT

This analysis addresses the potential impacts on the wildlife habitat types identified within the *Decision Area*. The analysis focuses on management alternatives that could result in physical disturbance to habitats or that could restore habitats to desired conditions. The following assumptions were used in the analysis of impacts on wildlife and fish habitat:

- Climatic fluctuation would continue to have a greater influence on habitats than any other factor or combination of influences.
- Grassland restoration treatments would have the greatest impact on wildlife and fish habitats of any resource management actions.
- Livestock grazing is a component of the existing and future conditions of wildlife and fish habitats throughout the planning and *Decision Area*s. The existing conditions of habitats are the result of decades of livestock grazing, and in some cases may be causing nonattainment of land health standards. Management toward attainment of land health standards is anticipated to improve wildlife habitat conditions over time. The rate of improvement would vary depending on the methods used, by alternative, to maintain and move toward attainment of health standards.
- The degree of impact on wildlife and fish habitats would depend on the intensity, area, and duration of management actions. Multiple actions or uses would be anticipated to have greater impacts to wildlife and fish habitats than single actions or uses.
- Some habitats that may be desired for a site may be unattainable, if plant communities have moved beyond a threshold where reference condition is no longer attainable without significant resource inputs.

All of the alternatives would be anticipated to have both beneficial and detrimental effects to fish and wildlife habitat. The discussion of impacts centers primarily on wildlife habitat, because of the small amounts of fish habitat (less than .01 percent of the acreage) in the *Decision Area* and protective designations for the limited fish habitat that are Common To All Alternatives. Alternatives B and C would protect fish habitats through ACEC designations. The beneficial impacts to wildlife habitat are anticipated to occur primarily as a result of protective designations that would limit degradation of wildlife habitat, and vegetation management including restoration of desert grassland wildlife habitats.

Wildlife populations fluctuate throughout the *Planning Area* as a result of climatic conditions, interactions with other species of flora and fauna, and human uses. Management decisions resulting from the selection of one of the plan alternatives, or a combination of one or more alternatives, would influence trends in wildlife habitat and populations over the life of the plan. Land use decisions and their implementation may impact wildlife and fish habitats by these mechanisms:

- Alteration of soil structure
- Altered vegetation structure
- Altered fire regime
- Alteration of water regimes
- Change in water quality
- Habitat fragmentation/continuity
- Habitat diversity
- Population genetic structure changes

Many of the effects of land use decisions on soils and vegetation would cause subsequent impacts to wildlife habitats and populations. Most impacts could occur primarily from surface disturbances that impact vegetation and spatial disruption by human activities.

The analysis of land use decisions is cumulative; analysis of a single resource allocation on an area without consideration of all other resource allocations on that area would not provide for adequate analysis of impacts to habitats. For example, consideration of allowing rights-of way in an area without including impacts from open vehicle use in the same area would not provide for sufficient analysis of the impacts of the alternative. Because of this, land use decisions that generally protect or enhance wildlife habitat are lumped together for analysis, as are diverse resource allocations that cause degradation of the wildlife habitat components listed above.

Land uses that protect and enhance wildlife habitat are generally and collectively beneficial, particularly to native wildlife that rely on large areas of relatively high-quality, undisturbed natural habitats. Land uses that disturb, reduce, or fragment large areas of natural habitat are generally detrimental to those species that benefit from protective and enhancing designations and uses. There are hundreds of wildlife species in the *Planning Area*, each with different habitat needs. Many of these species are able to thrive in a wide diversity of habitats, while some are dependent on undisturbed native ecosystems, and others exist mostly in ecosystems that are vastly altered from natural conditions. Discussions are based on changes to habitat that would influence but not entirely control wildlife populations by creating relatively more undisturbed and/or recovered habitat or creating more disturbed and fragmented habitat.

4.3.4.1 Impacts on Fish and Wildlife Habitat Common to All Alternatives

The various resource allocations contained in the four alternatives would not have immediate impacts on fish and wildlife habitat, or on any individual species. Rather, over time, the impacts of the alternative selected would become apparent and there would be significant differences in habitat conditions.

Grassland restoration would be expected to stabilize soils, increase grass cover, and improve forage conditions for desert grassland wildlife species. Those actions that benefit these species would have a commensurate detrimental impact on wildlife species that depend on desert shrub ecosystems. Those species would disperse into surrounding shrublands as grasslands are restored.

Under all alternatives, approximately 320,900 acres of existing WSAs and ACECs would continue to be closed to fluid mineral leasing and development including oil and gas and geothermal. This would

provide protection from habitat fragmentation, ground water contamination, loss of naturalness, and other detrimental aspects of this resource exploitation.

The preparation of travel management plans in in the future would limit vehicle use to routes that are necessary, appropriate, and are not causing resource damage. For example, route analysis could determine that a road in arroyo habitat is necessary for access but is not well-situated for wildlife. The road could be rerouted to a less detrimental location. These actions would have significant beneficial impacts on habitat quantity and quality, leading to larger and more stable wildlife populations.

Wildlife can benefit from and be harmed by developed water sources provided by ranchers on public land. Most species of wildlife would use these water sources. The storage tanks and troughs provide water but can also be hazardous. Birds, mammals, and herptiles, as well as invertebrates, can fall into straight-sided water tanks and drown. As the BLM renews livestock grazing permits, stipulations are added that the water sources on public land be left on yearlong for wildlife, and that wildlife escape ramps be installed and maintained (see Appendix D). These reduce the threat of entrapment and drowning.

Wildlife would be affected by geothermal leasing caused by the alteration, removal, reduction, or fragmentation of habitat. Habitat at drilling pads, facilities, roadways, and transmission corridors would be affected. The extent of the disturbance would be a function of the level of preexisting disturbance, the size, scale, and phase of geothermal development, and the type and quality of habitat. Due to the localized nature of the geothermal resource in the *Planning Area*, impacts would not be extensive, but since the Rio Grande Valley has the highest geothermal potential, impacts could be substantial along the river corridor. Geothermal development would have the greatest impact on wildlife if it were to occur in riparian areas, wetlands, or wintering and breeding areas (USDOI BLM 2008c).

4.3.4.2 Impacts of the Alternatives on Fish and Wildlife Habitat

Resource allocations or designations and uses, summarized in Table 2-12, would serve to protect and improve existing habitats by reducing or eliminating surface disturbance and human activity or confining those activities to particular areas. Damage and destruction of existing habitats would be reduced, habitat fragmentation would be reduced, and degraded habitats such as riparian areas would be able to recover.

Areas with restrictive management prescriptions such WSAs, ACECs, VRM Class I and II areas and right-of-way exclusion areas, would maintain large areas of core wildlife habitat, including some of the most productive and diverse habitats in the *Planning Area*. Restrictions on surface disturbance, OHV use, and installation of management facilities in these areas would help to preserve habitat quality and integrity. Table 4-4 compares protected habitat acres by alternative and habitat type.

TABLE 4-4
HABITAT TYPES IN PROTECTIVELY MANAGED AREAS BY ALTERNATIVE

HABITAT TYPE	A	B	C	D
Evergreen Forest	23,094	25,738	24,469	23,831
Grassland/Herbaceous	280,376	455,362	269,152	284,915
Shrub/Scrub	387,435	524,935	321,821	373,613
Barren Land	25,102	33,420	20,278	20,067
Developed/Agricultural	1,025	1,025	1,025	1,025
TOTAL	**717,032**	**1,040,480**	**636,745**	**703,451**

The anticipated detrimental impacts to wildlife and habitat would be caused primarily by increasing development on public land, development on land that leaves Federal ownership, and increased recreational use. OHV use would be the most widespread recreational use detrimental to wildlife habitat.

All of these actions usually result in degradation or loss of habitat. Land where wildlife habitat quality would be expected to be most degraded includes land leaving Federal ownership, utility corridors, solar energy projects, open pit mines, and OHV open areas. Land leaving Federal ownership through direct sale would be totally lost as public wildlife habitat, while land leaving Federal ownership through exchange could provide mitigation or even a net gain in wildlife habitat. Table 4-5 shows by alternative land where habitat loss would most likely occur or could be most degraded. Land identified for potential disposal represents the maximum potential disposal acreage; however, these identified acreages may not be disposed of during the life of this plan.

TABLE 4-5
ACRES OF WILDLIFE HABITAT TYPE MOST DEGRADED BY ALTERNATIVE

HABITAT TYPE	A	B	C	D
Evergreen Forest	58,081	5,994	17,537	19,846
Grassland/Herbaceous	725,032	36,433	73,645	78,134
Shrub/Scrub	891,316	196,951	278,785	319,049
Barren Lands	57,691	6,156	10,067	13,332
Developed/Agricultural	1,620	1,254	1,869	1,952
TOTAL	**1,733,740**	**246,788**	**381,903**	**432,313**

Even though disposal land could be lost as wildlife and fish habitat, it offers also an opportunity to indirectly enhance wildlife and fish habitat management and protection when the land is disposed of through exchange and BLM (or other Federal agencies) then acquires additional land in significant habitat areas such as riparian zones or special status species habitat. Disposal of land that does not provide fish habitat may still impact fish habitat downstream or downslope. Because of this, careful consideration should be made of potential disposal impacts of upland habitats on downslope areas within watersheds.

Impacts to wildlife habitat would be reduced through mitigation developed during subsequent NEPA analyses for any proposed Federal action. Habitats not in Special Designations or identified as subject to degradation that would be open to other activities are shown in Table 4-6.

TABLE 4-6
ACRES OPEN TO DEVELOPMENT WITH MITIGATION BY ALTERNATIVE AND HABITAT TYPE

HABITAT TYPE	A	B	C	D
Evergreen Forest	5,825	55,268	44,994	43,323
Grassland/Herbaceous	2,408	511,205	642015	639,951
Shrub/Scrub	368,249	925114	991831	954338
Barren Lands	9,207	52,424	61,655	58,601
Developed/Agricultural	555	921	306	223
TOTAL	**386,244**	**1,544,932**	**1,740,801**	**1,696,436**

4.3.4.2.1 Alternative A Impacts on Fish and Wildlife Habitat

Special Designations: Alternative A would protect over 719,000 acres of public land as habitat for wildlife by special designations (WSAs, ACECs, ROW Exclusion, OHV Closed, VRM Class I and II, and management for wilderness characteristics).

Approximately 320,900 acres of existing WSAs and ACECs would be closed to new rights-of-way including renewable energy projects. This represents about 11 percent of the *Decision Area*. Protecting these areas of diverse topography, landforms, and vegetation would also protect a diversity of habitat.

There would be no impact to wildlife habitat from the Alternative A decision for Wild and Scenic Rivers, which would delay the suitability determination for eligible segments until a later date.

Vegetation and Woodlands: The use of prescribed burning and wildfire, prescribed grazing management, herbicide treatments, and two years of growing season rest after treatment in grazing allotments benefits wildlife habitats that have been impacted by shrub encroachment.

Fish and Wildlife Habitat: The decision in Alternative A to attain biotic health through implementing HMPs would emphasize the management of mule deer, and pronghorn habitat.

Livestock Grazing: Opportunities for wildlife habitat enhancements or restoration would be done on a case by case basis associated with livestock forage allocation decisions, permit renewals, rangeland health assessments, and adopting lower utilization levels.

Comprehensive Trails and Travel Management: Alternative A would leave the most land designated as open to vehicle use, almost 59 percent of the public land in the *Decision Area*. Since open areas allow cross-country travel, habitat would steadily degrade, particularly for big game animals and species dependent on unfragmented desert grasslands. Ten percent of land would be closed to vehicle use, protecting those areas from habitat degradation. The remainder of the *Decision Area* would be limited to roads and trails, protecting the quality of wildlife habitat from degradation due to OHV use.

Lands and Realty: Retaining 89 percent of the public land would provide wildlife habitat, although retention alone does not preclude uses that could allow adverse effects to wildlife habitat. Disposal of up to 11 percent of the public land would not directly lead to wildlife habitat degradation, but the habitat on disposed lands would change depending on the end use. Housing subdivisions with natural landscaping can produce good quality habitat for many species of native wildlife with the exception of large mammals. High-density subdivisions and commercial development, generally eliminates land as habitat for most native wildlife species.

Renewable Energy: Solar energy projects use large areas (up to several thousand acres) where vegetation is bladed and removed, and the area reduced to a single use. Any wildlife dependent upon these habitats would move to adjacent areas or die off. Mitigation strategies for wildlife would be developed during site-specific NEPA analyses.

Wind energy development would result in clearing vegetation and habitat for road construction, turbine tower installation, transmission, and other facilities. This would result in habitat fragmentation; however some habitat connectivity would remain within the wind farm area or be regained once project installation is completed. The installation of turbine towers would introduce dangers of collisions between turbine blades and birds and bats where such dangers do not currently exist. Under Alternative A, more of the landscape would be open to wind turbines because fewer areas would be designated as avoidance or exclusion for new rights-of-ways. Impacts of wind energy development would be reduced by following the Las Cruces District Office Wildlife Protocol Standards for Wind Energy Projects (Appendix M).

Minerals: Closing of approximately 330,000 acres to fluid leasing (including geothermal) and subjecting an additional 27,000 acres to a no surface occupancy stipulation would prevent surface disturbing activities associated with mineral development in wildlife habitat. Geothermal leasing avoidance areas would preclude unmitigated development in wildlife habitat.

4.3.4.2.2 Alternative B Impacts on Fish and Wildlife Habitat

Special Designations: Designations protecting wildlife habitat conditions (WSAs, ACECs, vehicle closed areas, ROW exclusion areas) would be greatest under this alternative at 1,040,480 acres.

Determining that all five eligible segments of stream are suitable for inclusion into the National Wild and Scenic River System would not affect fish or wildlife habitat. It is unlikely that these extremely short, isolated, stream segments would be selected by the Secretary of the Interior or Congress for the WSRS. The Outstandingly Remarkable Values (ORVs) would continue to be maintained or enhanced by other decisions in this RMP. The ORVs associated with Cuchillo Negro Creek would be maintained or enhanced by the Critical Habitat designation under the Endangered Species Act.

Vegetation and Woodlands: Grassland restoration, with increases in vegetation going to watershed values and wildlife, would improve wildlife habitat, including increased forage production for wildlife, and increased ground cover and seed production for birds and small mammals. However, since passive methods of restoration would be emphasized under Alternative B, recovery of grassland communities would occur over a longer period of time and in fewer areas than would occur under Alternative A which uses active restoration methods. Habitat under Alternative B would be expected to improve over time, but at a slower rate and in fewer areas as compared to Alternative A. In some areas, passive restoration alone may not succeed.

Fish and Wildlife Habitat: Riparian habitat would be managed to meet ecological site capacity by modifying uses as needed. Desert bighorn sheep habitat management would be consistent with the NMDGF Recovery Plan, and would identify other suitable habitat for desert bighorn habitat management.

Livestock Grazing: Reducing AUMs by 25 percent in vegetation with limited restoration potential would increase grass cover in the short-term, which would increase forage production for wildlife, and increase ground cover and seed production for birds and small mammals on 34 percent of the *Decision Area*. This would improve vegetation conditions in the short term over a larger area compared to Alternative A.

Comprehensive Trails and Travel Management: Alternative B would leave the most land designated as closed to vehicle use; 10 percent of the public in the *Decision Area*. This would maintain wildlife habitat quality over time, particularly for big game animals and species dependent on desert grassland ecosystems. Habitats within areas currently designated as open to vehicle use, including most of the public land in Otero and Sierra Counties, would be better protected from further degradation than under Alternative A.

For route designations, the majority of the land in the *Decision Area* (85 percent) would be designated as limited to existing or designated routes, protecting the quality of wildlife habitat in those areas from degradation due to OHV use. The remaining 39,100 acres of the land that is currently designated as open to vehicle use would degrade wildlife habitat in the Red Sands and Aden Hills OHV areas. This area is mostly Mesquite Rolling Upland, Creosote Rolling Upland, and Mixed Shrub Rolling Upland habitat

Lands and Realty: Approximately 774,000 acres in existing WSAs and existing and proposed ACECs would be closed to new rights-of-way which would protect a variety of diverse and important wildlife habitats (28 percent of the *Decision Area*). Protecting these areas of diverse topography, landforms, and vegetation would also protect most habitat types found in the *Planning Area*.

Retaining 98 percent of the public land would provide wildlife habitat on the retained public land, although retention alone does not preclude activities that could allow adverse effects to habitat. Disposal

of up to 2 percent of the public land would not directly lead to habitat degradation, but the habitat on disposed lands would change depending on the end use.

Under Alternative B, 1,416,965 acres, or 41.8 percent of the public land identified for retention, would be managed under Habitat Management Plans. These Habitat Management Plans would benefit mule deer, antelope, and other big game, small game, and non-game species.

Renewable Energy: Under Alternative B, only the Afton SEZ would be available for solar energy projects. Most of this area is mesquite dune and creosote habitat. At full build-out, approximately 24,000 acres could be converted to solar energy production. This would mean the complete loss of the area as wildlife habitat. The quality of habitat is poor due to its current degraded ecological condition, and since this would be the only area available for solar energy development under this alternative, the loss of wildlife habitat in the *Decision Area* to solar energy would be up to 1.2 percent.

Impacts of wind energy development on habitat would be the same as under Alternative A but on a smaller scale since fewer acres would be available for development.

Minerals: Deferring oil and gas decisions until such time as a programmatic RMP amendment can be prepared would have the short term impact of averting impacts to wildlife habitat.

4.3.4.2.3 Alternative C (Preferred Alternative) Impacts on Wildlife and Fish Habitat

Special Designations: Under Alternative C, special designations including existing WSAs and proposed ACECs, plus ROW exclusion areas, would protect 637,000 acres (Table 4-5) of diverse and important wildlife habitats. This represents about 23 percent of the *Decision Area*.

Determining that all five eligible segments of stream are not suitable for inclusion into the National Wild and Scenic River System would not affect wildlife or fish habitat. It is unlikely that these extremely short, isolated, stream segments would be selected by the Secretary of the Interior or Congress for the WSRS. The ORVs would continue to be maintained or enhanced by other decisions in this RMP, and through Critical Habitat designation.

Vegetation and Woodlands: Grassland restoration, with increased forage production going to watershed values, wildlife, and lastly to livestock, would improve wildlife habitat, including increased forage production for wildlife, and increased ground cover and seed production for birds and small mammals. Wildlife habitat overall would be expected to improve significantly as compared to Alternative A, and at a faster rate, and a larger scale over the life of the plan, than under Alternative B.

Fish and Wildlife Habitat: Impacts of Alternative C would be essentially similar to impacts described in Alternative B.

Livestock Grazing: A watershed approach to rangeland health and assessment would improve the BLM's ability to effectively adjust livestock forage use where ecosystem function warrants it, leading to an increase in improved vegetation and habitat conditions compared to Alternative A. Compared to Alternative B, this alternative enhances habitat conditions in priority watersheds, whereas Alternative B only enhances conditions in sites with limited restoration potential.

Comprehensive Trails and Travel Management: In Alternative C significantly more land would be designated limited to vehicle use than Alternative A, and significantly less land designated as open to all vehicle use, both of which would result in greater protection of wildlife habitat quantity and quality, particularly for big game animals and species dependent on desert grassland ecosystems. Closed vehicle

routes would re-vegetate and stabilize. Over 98 percent of the public land in the *Decision Area* would be designated as closed or limited to existing roads and trails.

The land that is currently designated as open to vehicle use (42,000 acres) would remain open, preventing wildlife habitat recovery in the Red Sands and Aden Hills OHV areas. Increased OHV use in those areas is anticipated over time, leading to continued wildlife habitat degradation. The removal of the closed designation south of State Road 9 in Doña Ana County would have more than a minimal impact on wildlife habitat in that area.

Lands and Realty: Land disposal and retention would have impacts similar to Alternative B; 95 percent of the public land would be retained and up to 5 percent would be disposed.

Renewable Energy: Under Alternative C, the Afton SEZ would be available for solar energy development as well as sites outside avoidance and exclusion areas. Impacts from solar energy under Alternative C would be greater than those under Alternative B. For wind energy development, impacts would be the same as described under Alternative A, but fewer acres would be available for development.

Minerals: Impacts from Alternative C would be the same as described in Alternative B.

4.3.4.2.4 Alternative D Impacts on Wildlife and Fish Habitat

Special Designations: Impacts of special designations on habitat would be the same as described under Alternative A. The suitability of Tularosa Creek for the Wild and Scenic Rivers System would not affect fish and wildlife habitat because it is highly unlikely that the Secretary of the Interior or Congress would include this extremely short river segment, 1.4 miles, into the WSRS. Decisions in this RMP for Tularosa Creek in Recreation, and ACECs, would maintain or enhance its ORVs.

Vegetation and Woodlands: Grassland restoration, with increased forage production going primarily to livestock, would reduce benefits to wildlife habitat. Restoration would be accomplished with only active measures. Without the use of passive management to improve or maintain vegetation conditions, improvements would be short-lived and long-term benefits to wildlife habitat would not be realized.

Fish and Wildlife Habitat: Riparian habitat would be managed to achieve minimum standards, possibly foregoing opportunities to enhance and restore these habitats to meet the site's ecological capability, which is emphasized in Alternatives B and C. Desert bighorn sheep would be managed consistent with the NMDGF recovery plan, limiting opportunities for management in other suitable habitat when compared to Alternatives B and C.

Livestock Grazing: Impacts to wildlife habitat would be the same as those described in Alternative A.

Comprehensive Trails and Travel Management: The impacts of Alternative D would be similar to those described under Alternative C. The primary difference between these alternatives is the acreage designated as existing roads versus designated roads. Because most of the land in the *Decision Area* would be designated as limited to either existing or designated roads and trails, wildlife habitat in those areas would not degrade due to OHV use. Vehicle closures would be 17,000 acres under alternative D, compared to 19,000 acres in Alternative C.

Lands and Realty: Land disposal and retention would have impacts similar to Alternative B; 93 percent of the public land would be retained and up to 7 percent would be disposed.

Renewable Energy: Impacts from renewal energy would be the same as Alternative C.

Minerals: Impacts from Alternative D would be the same as described in Alternative B.

4.3.5 IMPACTS ON SPECIAL STATUS SPECIES HABITATS

4.3.5.1 Impacts on Special Status Species Common to All Alternatives

Grassland restoration would enhance habitat for grassland special status species including the Northern aplomado falcon.

Areas with less restrictive management prescriptions, but with some form of management limitations that would help maintain habitat quality, would include areas with OHV use limited to existing or designated routes, ROW avoidance areas, and areas with surface occupancy restrictions. These lands would comprise the majority of the public land in the *Decision Area*.

The anticipated detrimental impacts to special status species would be caused primarily by increasing permitted activities on public land, development of land that leaves Federal ownership, and increased recreational use. Land where wildlife habitat quality would be expected to be most degraded or lost as wildlife habitat include land leaving Federal ownership, utility corridors, and OHV open areas.

The species most at risk of habitat loss would be the sand prickly pear which could potentially be extirpated from public land identified for disposal. This land comprises the majority of this species habitat, and disposal of this land could potentially necessitate listing the sand prickly pear as a threatened or endangered species. Other developments that would adversely impact special status habitat include roads, utility corridors, off-highway vehicle use, and mineral development including locatable, leasable, and saleable minerals. Many special status species occur in the most rugged and remote areas, and are secure because their habitat is not conducive to human development. Also, many of these most rugged habitats are in special designation areas, where existing management prescriptions preclude activities that could degrade these habitats.

Impacts to special status species habitat from utility scale renewable energy projects would be minimal since all such habitat would either be closed because it is in a WSA or ACEC or it would be within a ROW avoidance or exclusion area. Any proposed renewable energy projects in these areas would be denied or moved to another location.

Under Alternatives B, C and D, all oil and gas leasing would be closed in WSAs and ACECs and deferred in the rest of the *Planning Area*. Therefore, there would be no impacts to wildlife habitat from new oil and gas leasing, exploration, development, or production within WSAs and ACECs and unleased areas under these alternatives. Existing leases could be developed, but impacts would be minimal and localized due to the small number and scattered nature of the leases and their low likelihood of production.

4.3.5.2 Impacts of the Alternatives on Special Status Species Habitats

4.3.5.2.1 Alternative A Impacts on Special Status Species Habitats

Special Designations: The No Action Alternative would maintain protection for special status species and their habitats, primarily in existing Special Management Areas including WSAs, existing ACECs, ROW exclusion areas, but also in the other protected lands. Special status species habitats that are not in protective designations could be degraded. The following ACECs have been established in part or in whole to protect habitat for special status species:

Aden Lava Flow	Organ/Franklin Mountains
Alamo Mountain	Robledo Mountains
Alkali Lakes	Sacramento Escarpment
Cornudas Mountain	Wind Mountain
Doña Ana Mountains	

4.3.5.2.2 Alternative B Impacts on Special Status Species Habitats

Special Designations: Designations that protect existing special status species habitat conditions (WSAs, ACECs, vehicle closed areas, ROW exclusion areas) would be greatest under this alternative. Ten percent of the *Decision Area* would be closed to vehicle use. This would be expected to maintain special status species quality over time. Habitats within areas currently designated as open to vehicle use, including most of the public land in Otero and Sierra counties, would be better protected from further degradation under Alternative B than under Alternative A. Additional ACEC designations under Alternative B that would enhance protection of Special Status Species habitat are:

Broad Canyon	Otero Mesa Grasslands
Brokeoff Mountains	Percha Creek
Caballo Mountain	Pup Canyon
Cornucopia	Sacramento Mountains
Doña Ana Mountains expansion	Six Shooter Canyon
East Potrillo Mountains	Southern Caballo Mountains
Jarilla Mountains	Tularosa Creek
Mud Mountain	Nutt Mountain

Vegetation and Woodlands: Under this alternative, grassland restoration would be through passive means only. This would most likely result in fewer acres being restored and requiring a longer period of time to do so. Increase in the amount or quality of aplomado falcon habitat would be minimal.

Comprehensive Trails and Travel Management: The majority of the land (85 percent) in the *Decision Area* would be designated as limited to roads and trails, protecting the quality of special status species habitat in those areas from degradation due to OHV use. Vehicle use in the Red Sands and Aden Hills areas would not have significant impacts on special status species or their habitats.

Lands and Realty: Under Alternative B, retention of sand prickly pear habitat near Anthony should preclude the necessity of listing that species as threatened or endangered.

4.3.5.2.3 Alternative C Impacts on Special Status Species Habitats

Special Designations: Alternative C would maintain protection for special status species and their habitats in over 637,000 acres of WSAs, ACECs and lands with wilderness characteristics. Additional ACEC designations under Alternative C that would enhance protection of Special Status Species habitat would include:

Broad Canyon	Otero Mesa Grasslands
Brokeoff Mountains	Percha Creek
Caballo Mountain	Pup Canyon
Cornucopia	Sacramento Mountains
Doña Ana Mountains expansion	Six Shooter Canyon
East Potrillo Mountains	Southern Caballo Mountains
Jarilla Mountains	Tularosa Creek
Mud Mountain	VanWinkle Lake
Nutt Mountain	

Vegetation and Woodlands: Grassland restoration projects would be accomplished using both passive and active means. Consequently, more acres in more areas could be converted to grassland or grassland-shrub habitats. This would potentially increase the amount of quality habitat for aplomado falcons.

Comprehensive Trails and Travel Management: The majority of the land in the *Decision Area* would be designated as limited to (either designated or existing) roads and trails, protecting the quality of special status species habitat in those areas from degradation due to OHV use. Red Sands and Aden Hills OHV open areas would remain open, but these areas are not special status species habitat. The removal of the closed designation south of State Road 9 in Doña Ana County, which has never been enforced, would not have a significant impact on special status species habitat. Additional vehicle closures under this alternative would bring the total closed acreage to 62,000 acres, or 2.2 percent of the public land in the *Decision Area*, which would be protected from habitat degradation by OHV use.

Lands and Realty: Disposal of up to 5 percent of the public land may lead to wildlife habitat degradation, depending on the end use of the land. Retention of sand prickly pear habitat near Anthony should preclude the necessity of listing that species as threatened or endangered.

4.3.5.2.4 Alternative D Impacts on Special Status Species Habitats

Special Designations: No additional ACEC designations would be implemented and impacts would be similar to Alternative A.

Vegetation and Woodlands: Grassland restoration projects would be done exclusively by active means. However, without passive measures as well such as proper grazing management, the full benefit of the restoration projects may not be realized. This could result in fewer acres of aplomado falcon habitat.

Comprehensive Trails and Travel Management: For route designations and closures, Alternative D impacts to Special Status Species Habitats would be the same as Alternative C.

4.3.6 IMPACTS ON CULTURAL RESOURCES

Management of cultural and heritage resources is usually a non-surface-disturbing activity that involves inventory, site monitoring, and occasionally placement of site protection. Some cultural and heritage resource management activities, such as installation of protective fencing to exclude livestock or motorized vehicles, excavation, and interpretive projects, could affect cultural and heritage resources. Such projects usually involve disturbance of less than 1 acre in any given year.

The extent of impacts on cultural and heritage resources among the alternatives varies in regard to three primary factors: (1) the type and intensity of uses of public land, especially the extent of surface-disturbing activities; (2) the extent of area specially designated to protect cultural and heritage resources (as a primary, secondary, or coincidental purpose); and (3) the location of resource uses.

Cultural and heritage resources continue to be discovered on land administered by BLM, but the quantity and nature of those resources are not known until they are found and evaluated. Models developed in conjunction with Class I cultural resources inventory provide an estimate of the potential for cultural and heritage resources. The impact assessment focuses on the potential of the various elements of each alternative to achieve the desired future conditions for the protection, conservation, management, and appropriate use of cultural and heritage resources over the life of the RMP.

The four major elements of the cultural program include: (1) inventory and evaluation, (2) protection and preservation, (3) resource use in accordance with resource allocations, and (4) planning. The impact analysis assumed that, regardless of which alternative is selected, the cultural resource program would continue to be implemented in accordance with BLM policies, which implement numerous Federal laws and regulations such as Section 106 of the National Historic Preservation Act. Section 106 reviews assess impacts on cultural resources in consultation with the State Historic Preservation Officer and other interested agencies and parties. The consulting parties work to modify proposed activities to avoid any identified adverse effects on cultural resources that are eligible for the National Register of Historic Places or to implement measures to reduce or mitigate adverse effects that cannot be reasonably avoided. Those decisions are made administratively and do not require RMP decisions.

The analysis of alternatives assumed that actions identified to preserve, protect, study, and interpret cultural resources, would be pursued administratively regardless of which alternative is selected.

4.3.6.1 Impacts on Cultural Resources Common to All Alternatives

Under all alternatives, cultural resources would continue to be affected by natural weathering and erosion. The loss or damage of cultural and heritage resources would result from unmitigated ground disturbance (e.g., cross-country OHV travel or wildfires). These impacts would continue to occur regardless of which alternative is selected and would be addressed on a case-by-case basis as they are recognized.

Management of all resources have potential to affect cultural and heritage resources to some degree, but decisions regarding air quality, special status species, paleontological resources, and wilderness characteristics, are likely to have no more than minimal impacts, regardless of which alternative is selected. Activities and projects associated with the management of soils, water resources, vegetation, fish and wildlife, and minerals, as well as livestock grazing, wildland fire management, utility corridors, and solar, wind, and geothermal projects could involve soil disturbance, which in turn has the potential to affect cultural resources. Those activities would be evaluated on a case-by-case basis so that potential effects on cultural resources could be avoided, reduced, or mitigated. Some management activities associated with those resources could help protect cultural resources by reducing erosion, reducing heavy

fuel loads, improving livestock distribution, or otherwise curtailing ground disturbance. Resource decisions that could have a potential major impact on cultural and heritage resources would include: travel routes, recreation and visitor services, lands and realty, and special designation areas.

Disposal of Federal land would eliminate the Federal regulatory protection, the effects of disposal on cultural and heritage resources would be considered and addressed prior to any disposals. Land not designated as avoidance or exclusion areas for rights-of-way would potentially be open to siting renewable energy projects.

Impacts to cultural resources could potentially occur during all phases of ground disturbing development of a geothermal lease, exploration, drilling, and utilization. The magnitude and extent of the impact would depend on the current state of the cultural resources and their eligibility for the National Register of Historic Places. The drilling operations phase includes drill site development, which on average would require ground disturbance within a two-acre area plus a buffer to accommodate additional production wells, injection wells, and fluid sump pits. Any cultural resources or historic landscapes of cultural resources would be directly impacted by the ground disturbance. Impacts would be mitigated by avoiding the cultural site, data recovery or other means determined during NEPA analysis for well development.

4.3.6.2 Impacts of the Alternatives on Cultural Resources

4.3.6.2.1 Alternative A Impacts on Cultural Resources

Special Designations: Under Alternative A, designating ACECs to protect cultural and heritage resources from the threat of irreparable harm would help retain existing cultural and heritage resource conditions. Nine ACECs have been designated, in whole or in part, to protect cultural resources.

There would be no impact to cultural resources from the Alternative A decision for Wild and Scenic Rivers, which would delay the suitability determination for eligible segments until a later date.

Under Alternative A, El Camino Real de Tierra Adentro National Historic Trail and associated VRM Class II area would continue to be managed pursuant to the RMP (USDOI BLM 2004a), which prohibits surface disturbance within a ¼-mile wide corridor centered on well-defined segments of the trail.

Under Alternative A, land use within a 1-mile wide corridor centered on the Lake Valley Back Country Byway and a ¼-mile wide corridor for the Butterfield Overland Trail would continue to be managed to prevent surface disturbance, helping to retain cultural and heritage resources in areas near these trails.

Comprehensive Trails and Travel Management: Dispersed recreation and OHV use in unrestricted areas have the potential to disturb cultural and heritage resources. Under Alternative A, approximately 1,644,000 acres would remain open to OHV cross-country which creates the potential for cross-country travel to impact cultural resources. Aden Hills open OHV area (8,000 acres) would remain open; however this is in a designated OHV area which has been cleared for such use and no impacts to cultural resources would be expected. Vehicle use in other areas would be limited to existing or designated routes, indirectly limiting impacts to cultural resources.

Recreation and Visitor Services: Under Alternative A, the 61,000-acre Organ/Franklin Mountains SRMA and the 8,300-acre Doña Ana Mountains SRMA would continue to be managed for public recreation. Recreational activities could increase potential disturbance of cultural and heritage resources, but SRMAs also provide potential for interpretation of cultural resources as part of recreation management.

Lands and Realty: Installation of new utilities within utility corridors could threaten cultural and heritage resources, measures to avoid, reduce, or mitigate any identified adverse effects would be implemented pursuant to established procedures of the cultural resource program.

4.3.6.2.2 Alternative B Impacts on Cultural Resources

Special Designations: Managing 520,000 acres as ACEC could help retain cultural resources by restricting surface-disturbing activities on 83 percent more land than under Alternative A.

Alternative B would increase the no surface disturbance to a corridor ½-mile wide, centered on well-preserved segments of the El Camino Real de Tierra Adentro, Butterfield Overland Trail and the Mormon Battalion Trail. This would retain cultural resource conditions to a greater extent than Alternative A.

Determining that all five eligible segments of stream are suitable for inclusion into the National Wild and Scenic River System would not affect cultural resources. It is unlikely that these extremely short, isolated, stream segments would be selected by the Secretary of Interior or Congress for the WSRS. The cultural ORVs would be maintained or enhanced by the Three Rivers ACEC and the Tularosa ACEC, if selected.

Comprehensive Trails and Travel Management: Reducing the area managed as open to cross-country OHV use by 98 percent would reduce disturbance cultural resources relative to Alternative A. Designating 259,110 acres and 346 miles of routes as closed to OHV would reduce surface disturbance compared to Alternative A, which designates only 43,000 acres and 84 miles as closed. Prohibiting cross-country OHV use and closing selected areas to vehicle use could reduce the damage to and loss of cultural and heritage resources.

Recreation and Visitor Services: Under Alternative B, five areas would be allocated as SRMAs and ERMAs. These areas would be more intensively managed for recreation use, meaning more facilities and more visitors, which could impact cultural resources that are onsite. In three of these areas, OHV use would be limited to designated routes which would limit or eliminate impacts to resources from such uses. Two areas, Aden Hills and Red Sands SRMAs, are open to OHV use; however, most of the trails have been surveyed and cleared. The use of SRMAs and ERMAs could disturb of cultural and heritage resources on a localized basis but also would provide more interpretation of cultural and heritage resources than Alternative A.

Lands and Realty: Cultural resources could retain more Federal regulatory protection under Alternative B through the retention of more public land than under Alternative A. Under Alternative B, 38,273 acres would be designated for disposal compared with 213,199 acres under Alternative A.

Renewable Energy: The proposed Afton SEZ has potential for containing important cultural resources, especially in the dune areas in the northern and eastern portion of the SEZ. Solar energy development could impact cultural resources within the SEZ. A cultural resources survey of the entire area of potential effect of a proposed project, including consultation with affected American Indian Tribes would be conducted to identify archaeological sites, historic structures and features, and traditional cultural properties, and an evaluation would follow to determine whether any are eligible for listing in the NRHP as historic properties. Potential impacts would be minimized through the implementation of required programmatic design features for site avoidance, project relocation, or data recovery.

4.3.6.2.3 Alternative C (Preferred Alternative) Impacts on Cultural Resources

Special Designations: Under Alternative C, one new ACEC would be designated to protect cultural resources –the Brokeoff Mountain ACEC. One new ACEC would be designated to protect scenic and cultural resources (Picacho Peak ACEC). Under Alternative C, the extent of ACECs designated to protect cultural resources would be more than Alternative A, but 28 percent less than Alternative B.

Under Alternative C, management of El Camino Real de Tierra Adentro National Historic Trail, Butterfield Overland Trail, and Mormon Battalion Trail would be the same as under Alternative B.

Determining that all five eligible segments of stream are not suitable for inclusion into the National Wild and Scenic River System would not affect cultural resource. It is unlikely that these extremely short, isolated, stream segments would be selected by the Secretary of the Interior or Congress for the WSRS. The cultural ORVs would continue to be maintained or enhanced by the Three Rivers ACEC and the Tularosa ACEC, if selected.

Comprehensive Trails and Travel Management: Managing 42,000 acres as open to cross-country OHV could help retain cultural resources over a greater area compared to Alternative A, but slightly less (2,900 acres) than Alternative B. The total closure of 20,000 acres to OHV use is about 42 percent less than the area closed under Alternative A and 7 percent of that closed under Alternative B.

Recreation and Visitor Services: Alternative C would designate two ERMAs, the Aden Hills ERMA, which would be increase to 8,000 acres compared to 5,100 acres for Alternative B, and the Red Sands ERMA, 34,000 acres. In addition, the Elephant Butte ERMA, 36,500 acres, would be designated. Overall, Alternative C would provide more opportunities for public recreational activity that could increase potential localized disturbance of cultural resources, but would provide more potential for public interpretation of cultural resources than Alternatives A and B.

Lands and Realty: Alternative C allocates more public land for disposal than Alternative B, but less than Alternative A. Under Alternative C, 108,450 acres are designated for disposal, compared with 38,273 acres under Alternative B.

Alternative C would maintain existing utility corridors and establish a 1-mile-wide north-south energy corridor along Interstate 25. Under Alternative C, 209,000 acres of utility corridors would be allocated, approximately 30 percent more than Alternative B. Designation of utility corridors could disturb cultural resources, but the surveys completed prior to utility installations would provide additional information about cultural and heritage resources and any impacts on significant resources would be addressed before new utilities are constructed.

Renewable Energy: Impacts on cultural resources of solar energy development in the Afton SEZ would be the same as those described under Alternative B

4.3.6.2.4 Alternative D Impacts on Cultural Resources

Special Designations: Under Alternative D, the impacts of special designations would be the same as those described under Alternative A. The suitability of Tularosa Creek for the Wild and Scenic Rivers System would not affect cultural resources because it is highly unlikely that the Secretary of the Interior or Congress would include this extremely short river segment, 1.4 miles, into the WSRS. Decisions in this RMP for Tularosa Creek in the Recreation and Visitor Services section, would maintain or enhance its ORVs.

Comprehensive Trails and Travel Management: Under Alternative D, 42,000 acres would be designated as open to cross-country OHV use, which is the same as Alternatives B and C. A 17,000-acre closure to OHV use would slightly increase potential disturbance of cultural and heritage resources compared to Alternative C.

Recreation and Visitor Services: One additional ERMA - Caballo Mountain (41,000 acres) and one additional SRMA - Tularosa Creek (230 acres) would be established under Alternative D. Alternative D would provide more opportunities for interpretation of cultural resources than all other alternatives, but more recreational activity could increase potential disturbance of cultural and heritage resources in localized areas.

Lands and Realty: Alternative D allocates more public land for disposal than Alternatives B and C. This could increase the area where Federal management of cultural resource would be eliminated. Alternative D would maintain existing utility corridors and establish a 2-mile wide north-south energy corridor along Interstate 25, which is an increase in width and may result in more disturbance than the other alternatives.

Renewable Energy: Impacts on cultural resources of solar energy development in the Afton SEZ would be the same as those described under Alternative B.

4.3.7 IMPACTS ON PALEONTOLOGICAL RESOURCES

This section discusses impacts on paleontological resources that could occur from management of other resources and resource uses. Destruction of paleontological resources occurs from natural weathering and erosion, surface-disturbing activities, excavation, and theft or vandalism. Important contextual data also can be irretrievably lost in the case of theft and vandalism.

Unlike cultural resources, which may exist largely at or near the land surface, paleontological resources are found both at the surface and throughout the subsurface environment. Surface-disturbing activities involving excavation can "*discover*," while at the same time inadvertently damage or destroy sub-surface paleontological resources. When discovery occurs, resources can be curated for scientific, educational, and/or recreational values. Management actions that result in erosion do not necessarily damage paleontological resources; however, excessive erosion resulting from surface disturbance could damage fossils present at the surface.

Increased access to areas could allow for the discovery of paleontological resources, which could lead to proper collection and curation of the resource. Conversely, with increased access the fossil resource could be damaged, destroyed, or lost due to vandalism or theft. Restriction of public access could both reduce the potential for discovery and diminish the chance of vandalism or theft.

The impact analysis and conclusions are based on BLM's knowledge of resources and the project area, review of existing literature, spatial analysis, and information provided by other agencies. Impacts are quantified where possible. In the absence of quantitative data, qualitative impacts and the direction of impact are identified. The analysis is based on the following assumptions:

- Paleontological resources would continue to be discovered throughout the *Decision Area*.
- Paleontological resources identified during assessments and inventories would be protected through data collection and mitigation.
- The number of localities that could be impacted by various actions would be directly correlated with the degree, nature, and quantity of surface-disturbing activities within the *Decision Area*.

- Surface-disturbing activities could expose, dislodge, or damage paleontological resources and features that were not visible prior to surface disturbance.

Under all alternatives, impacts on paleontological resources are not anticipated as a result of implementing management actions for the following resources or resource uses: air quality, cultural resources, and livestock grazing.

4.3.7.1 Impacts on Paleontological Resources Common to All Alternatives

Implementing the potential fossil yield classification (PFYC) system and evaluating all proposed surface-disturbing actions would reduce impacts. Mitigation measures include project relocation or redesign or various scientific data recovery methods such as recording, surface collection, or excavation. These mitigation actions would prevent significant impacts and increase the knowledge and understanding of the area's paleontological resources and of the history of life on earth.

Through this evaluation process, proposed land uses would not destroy important vertebrate fossils or other scientifically significant fossil resources. Proposed land uses would include actions such as mineral exploration and development (including fluid-mineral development), development or construction within rights-of-way, or range improvements. However, inadvertent damage to paleontological resources that are undetected during the evaluation process could occur. Inadvertent damage to vertebrate fossils or other scientifically significant paleontological resources generally would be a significant impact.

Paleontological resource assessments would be performed on a case-by-case basis prior to proposed land uses. Based on the findings of the assessment, mitigation would be implemented at all phases of development. Although assessments would minimize the potential for impacts on known paleontological resources, they would not require an onsite inventory prior to all disturbances. This could result in the inadvertent damage of unidentified paleontological resources and a loss of their scientific values, although mitigation would reduce the magnitude of damage through data recovery.

Monitoring scientifically important paleontological localities would document the rate of deterioration and provide baseline data for possible site protection, restoration, or data retrieval. Paleontological inventory data could lead to better resource protection from increased understanding of the spatial and temporal distribution of paleontological resources. Hobby/personal collection of paleontological resources reduces the number of fossils.

Education programs would indirectly protect fossils. Providing interpretive opportunities could provide more paleontological resource sites for public use and education because inventories would be required to recover scientifically important data prior to allowing public use of the sites. This would also instill stewardship values that would lead to increased protection of, decreased inadvertent damage to, and decreased vandalism and looting of paleontological sites.

Wildland fire suppression activities (e.g., construction of fire lines, bulldozing of access roads, and general movement of heavy equipment) that disturb the surface could dislodge or damage fossils. In addition, some methods of vegetation treatment or restoration activities could disturb the surface. Restoration activities would be foregone where fossils are known to be present.

Prior to any transfer of land from public ownership, paleontological resources would be inventoried and evaluated and adverse effects would be mitigated to ensure that land with scientifically significant paleontological resources are retained or that the maximum benefit from known resources is obtained.

Removal of vegetation and soil from the surface may expose fossils. The largest potential impacts on paleontological resources would occur where surface disturbances take place in formations with high potential for paleontological resources.

Unlike permitted activities that are subject to site-specific evaluations and monitoring, dispersed recreation activities are not under the same degree of scrutiny. The widespread occurrence and generally unsupervised nature of dispersed recreational use, such as unauthorized collecting, could result in unmitigated impacts on paleontological resources exposed at the surface.

Impacts to paleontological resources could potentially occur during all phases of development of a geothermal lease: exploration, drilling, and utilization. Any permanent construction or ground disturbances within a resource's boundaries would cause long-term impacts.

4.3.7.2 Impacts of the Alternatives on Paleontological Resources

4.3.7.2.1 Alternative A Impacts on Paleontological Resources

Comprehensive Trails and Travel Management: Allowing cross-country OHV use on 1.64 million acres and designating 19,000 miles of routes as open to motorized vehicle may increase erosion, and could break, spread, and otherwise disturb paleontological resources at the surface. In addition, managing 1.05 million acres as limited to existing routes and 72,000 acres as limited to designated routes could result in minimal impacts paleontological resources located adjacent to routes in these areas.

Closing 43,000 acres to OHV use would eliminate indirect impacts from vehicle use and could reduce the accessibility of remote paleontological localities. Because the designated routes currently exist and receive use, additional impacts on or adjacent to them would be minimal.

Vegetation and Woodlands: Implementing different vegetation treatments, which strive to improve wildlife habitat and livestock forage, could increase short-term erosion rates, exposing more paleontological resources for potential identification and increasing the potential to erode, remove, or destroy fossils from the bedrock. The potential for impacts on paleontological resources from vegetation treatments would be low, as mitigation would prevent excessive erosion in treated areas.

Lands and Realty: Under Alternative A, projects in lands not designated as avoidance or exclusion areas for rights-of-way could impact paleontological resources depending on the size, location, and technology used for the project. Using the Potential Fossil Yield Classification (PFYC) map to aid in locating projects could help to minimize impacts. In addition, mitigation measures such as avoidance of sites, data recovery, or other practice could be implemented. It is possible that some paleontological localities could be damaged or destroyed due to the magnitude of the project and the site preparation required. Areas with important known paleontological resources would be avoided during the initial screening process.

Minerals: Managing approximately 3.65 million acres as open to fluid-mineral leasing with standard terms and stipulations and 170,000 acres managed as open to fluid-mineral leasing with CSU could lead to damage of paleontological resources if fluid mineral exploration and development activities occurred in these areas. Surface disturbance could increase short-term erosion and could disturb localized areas.

4.3.7.2.2 Alternative B Impacts on Paleontological Resources

Impacts on paleontological resources would be similar to Alternative A, except for areas where the management of other resources could restrict or allow surface-disturbing activities. Requiring on-the-ground paleontological inventories prior to permitting surface-disturbing activities in Class 1 and 4 paleo-sensitive areas would result in the identification, evaluation, and protection of scientifically significant fossil resources. As the number of paleontological inventories increases compared to Alternative A, knowledge of the area's paleontological resources would increase. More paleontological localities would be identified, and there would be an associated reduction in the number of localities damaged prior to surface-disturbing activity, thus reducing impacts on paleontological resources relative to Alternative A.

Special Designations: Managing ACECs and WSAs by prohibiting access for exploration, excavation, and removal of paleontological resources or other areas with sensitive resources could reduce the discovery of paleontological resources when compared with Alternative A. However, paleontological resources will be more vulnerable to erosion and weathering because they will not be collected and preserved.

Comprehensive Trails and Travel Management: Managing 260,000 acres as closed to OHV use would reduce the area where damage to paleontological resources could occur. Impacts to these resources would be less than Alternative A.

Vegetation and Woodlands: Short-term restoration of areas using passive methods could increase erosion rates, exposing more paleontological resources for potential identification. Long-term, passive restoration would help protect paleontological resources in place by reducing potential erosion.

Lands and Realty: Managing 1,030,000 acres as rights-of-way exclusion or avoidance areas would help retain paleontological resources by reducing surface disturbance. Over the long-term, these management actions would help protect existing paleontological resources to a greater extent than Alternative A.

Renewable Energy: The potential for impacts on paleontological resources in the Afton SEZ are relatively high, especially along the eastern edge of the mesa or breaks above the Rio Grande Valley. These areas are PFY Class 4 or 5 which means a high potential for occurrence of important fossils.

Minerals: Existing oil and gas leases could be developed, however, impacts to paleontological resources would not be likely because of the small number and scattered nature of the leases, and their locations in areas of low potential fossil yield. In the remainder of the *Planning Area* there would be no impacts from oil and gas leasing, exploration or development in the short term because that area would be deferred from leasing until a programmatic EIS addressing leasing, exploration and development of oil and gas resources is prepared in the future.

4.3.7.2.3 Alternative C (Preferred Alternative) Impacts on Paleontological Resources

Special Designations: Impacts of Alternative C are similar to those described in Alternative B but 41 percent fewer acres would be affected.

Comprehensive Trails and Travel Management: Managing 20,000 acres as closed to OHV use would provide less protection than Alternative B which proposes to close 260,000 acres to OHV use. OHV open areas would be slightly greater under Alternative C (1 percent) as compared to Alternative B. However, paleontological resource surveys in the open areas have revealed no resources that have been or could be damaged.

Vegetation and Woodlands: Restoring areas using passive and active methods could result in a short-term increase in erosion. However, using both passive and active methods would reduce short-term erosion compared with Alternatives A and B. In the long-term, using both passive and active treatments could improve resource conditions to a greater extent than under Alternative B. This could reduce the indirect loss of paleontological resources over a greater area compared to Alternatives A and B.

Lands and Realty: Managing 766,000 acres as rights-of-way avoidance and exclusion areas would result in the same impacts as described under Alternative B but on a slightly smaller area.

Renewable Energy: The impacts to paleontological resources from solar energy development within the Afton SEZ are the same as those described under Alternative B.

Minerals: The impacts to paleontological resources from oil and gas leasing are the same as those described under Alternative B.

4.3.7.2.4 Alternative D Impacts to Paleontological Resources

Impacts on paleontological resources would be the same as under Alternative C, except for the areas where the management of other resources could allow surface-disturbing activities. Requiring on-the-ground paleontological inventories prior to permitting surface-disturbing activities in Class 3 and 4 paleo-sensitive areas would result in the identification, evaluation, and protection of scientifically significant fossil resources.

Special Designations: Impacts from Alternative D would be the same as described in Alternative A.

Comprehensive Trails and Travel Management: Impacts from OHV management would be the same as under Alternative C. Managing 78,000 acres as limited to designated routes could increase impacts on paleontological resources as compared to Alternatives A, B, and C.

Vegetation and Woodlands: Restoring areas using only active methods could increase erosion rates, as areas may not recover without accompanying passive restoration methods. This could expose more paleontological resources and increase the potential for them to erode and remove fossils from the bedrock (along with the associated diagnostic matrix) when compared with Alternatives A, B, and C.

Lands and Realty: Managing 761,000 acres as rights-of-way avoidance and exclusion areas would result in the same impacts as described under Alternative C but on a slightly smaller area.

Renewable Energy: The types and likelihood of impacts to fossils from solar energy development within both the Afton SEZ are the same as those described for the Afton SEZ under Alternative B.

4.3.8 IMPACTS ON VISUAL RESOURCES

This section discusses potential impacts on visual resources that could occur from management of other resources and resource uses. VRM Inventory Classes and VRM Classes have been used to guide the impact analysis. This analysis focuses on impacts from the alternative management decisions that would impact the natural visual landscapes. Assumptions used in this analysis are as follows:

- VRM class objectives would apply to all resources on BLM-administered land. VRM class objectives would be adhered to through project design, avoidance, or mitigation.
- VRM class objectives are prescriptive for all resources and uses. Activities proposed would meet VRM objectives for the area, or would be mitigated to the extent needed to meet the objectives. Activities proposed that could not be mitigated would not be authorized.
- New surface-disturbing activities proposed would be subject to NEPA analysis, including a VRM contrast rating.
- The Visual Resource Inventory (2010) accurately captured the visual values of the *Planning Area*.

4.3.8.1 Impacts on Visual Resources Common to All Alternatives

Designations of VRM Classes are based upon management decisions that would either have an adverse or beneficial impact to visual resources within the *Planning Area* depending on the variation between the Visual Resource Inventory (VRI) class and VRM management class for a particular area.

When VRM Classes are designated in contrast to the visual inventory analysis, there are potential impacts to the scenic quality, sensitivity rating and distance zone of that area. Initially, those potential visual impacts are measure by the allowable level of impacts of an area (VRM) compared to the visual analysis.

4.3.8.1.1 Potential Decreases in Visual Quality

Comprehensive Trail and Travel Management: Increases in the number of routes and open areas would increase the level of dust and vegetation loss. Dust could be visible during regular short term intervals, reducing visibility of landscape features and the quality of light and the atmosphere. Lines of vegetation loss would be visible long-term due to creation of new routes resulting in changes to color and texture of the characteristic landscape.

Recreation and Visitor Services: New recreation developments would be constructed to meet VRM class objectives. There could also be an increase in litter in concentrated use areas, further impacting visual resources.

Lands and Realty: Impacts may include vegetation loss, fragmentation from roads, intrusions from water tanks, power poles, tower lattices, and lines, and the development of other structures impacting visual resources by creating a contrast in the basic visual elements of form, line, color, and texture.

Renewable Energy: Impacts include new roads, structures such as solar panel and wind turbine installations spread across open space that may skyline against the horizon. Turbines would have moving parts and solar panels may reflect light over distances, negatively impacting visual resources.

Minerals: Impacts from mineral exploration and development activities include removal of vegetation and soil resulting in changes to landscape forms and production of fugitive dust from associated traffic. Development of fluid minerals would result in the development of roads, well heads, or pump jacks, pipeline related valves, meter houses, and other structures which could cause visual contrast.

4.3.8.1.2 Potential Increases to Visual Quality

Special Designations: More restrictive VRM classes prescribed for special designations would allow less change to the form, line, color, and texture of the characteristic landscapes.

Visual Resources: Allocating the visual resources with higher management objectives than the relative value they were rated for in the inventory can protect scenic quality according to the value placed on it by the public. While VRM objectives generally do not allow or preclude activities, areas to be managed according to VRM classes that have more restrictive objectives have greater potential to maintain views that appear undeveloped at the broad landscape level.

Comprehensive Trails and Travel Management: Any decrease in motorized routes would reduce the level of dust and vegetation loss. A greater value of resources through increased management could also limit inappropriate OHV use.

Recreation and Visitor Services: Increased value and awareness of resources through increased management could reduce vandalism, litter, and vegetation loss from recreational users.

Lands and Realty: Consolidation of utilities in rights-of-way corridors would concentrate visible structures in a limited number of areas rather than spreading them across the landscape.

4.3.8.2 Impacts of the Alternatives on Visual Resources

4.3.8.2.1 Alternative A Impacts on Visual Resources

Under Alternative A, there is no variation between the VRI I acres and the VRM class I acres, so potentially all of the 38,521 acres would continue to retain and preserve the existing character of the landscape (visual values). About 82 percent of the VRI II acres would be in the VRM Class II acres, meaning 18 percent of the VRI II acres would only partially or not at all retain the existing character of those acres (Table 4-7). Approximately 82 percent of the VRI III acres would be in the VRM Class III lands, resulting in only partially retaining the character of those lands. VRI IV acres would have over 100 percent in the VRM Class IV lands, resulting in a potentially high level of change to those lands.

4.3.8.2.2 Alternative B Impacts on Visual Resources

There is no variation between the VRI I acres and the VRM Class I, so all of the 343,253 acres in the VRM I would retain and preserve its existing character of the landscape (visual values). With VRI II, 100 percent of the VRI II acres would be in the VRM Class II, allowing for a low level of change to the existing character of the landscape (Table 4-7). About 78 percent of the VRI III acres would be in the VRM Class III, resulting in only partially retaining the character of those lands. And 72 percent of the VRI IV acres would be in VRM Class IV, potentially resulting in a high level of change to those lands.

4.3.8.2.3 Alternative C (Preferred Alternative) Impacts on Visual Resources

Under Alternative C, there is no variation between the VRI I acres and the VRM class I, so all of the 271,406 acres in the VRM I would retain and preserve its existing character of the landscape (visual values). Approximately 100 percent of the VRI II acres would be in the VRM Class II, allowing for a low level of change to the existing character of the landscape (see Table 4-7). Approximately 79 percent of the VRI III acres would be in the VRM Class III, resulting in only partially retaining the character of those lands. Approximately 77 percent of the VRI IV acres would be in the VRM Class IV, potentially resulting in a high level of change to those lands.

4.3.8.2.4 Alternative D Impacts on Visual Resources

Under Alternative D, there is no variation between the VRI I acres and the VRM class I, so all of the 265,526 acres in the VRM I would retain and preserve its existing character of the landscape (visual values). Only 98 percent of the VRI II acres would be in the VRM Class II, potentially allowing for 2 percent of those acres to partially or not at all retain the existing character of those lands (Table 4-7). About 79 percent of the VRI III acres would be in the VRM Class III, resulting in only partially retaining the character of those lands. Approximately 98 percent of the VRI IV acres would be in the VRM Class IV acres, potentially resulting in a high level of change to those lands.

TABLE 4-7
VISUAL RESOURCE INVENTORY VALUES FOR THE *TRICOUNTY DECISION AREA*

		ALTERNATIVES/PERCENT							
VRI INVENTORY RESULTS (ACRES)		**A**	**%**	**B**	**%**	**C**	**%**	**D**	**%**
VRI I*	0	38,521	0%	343,253	0%	271,406	0%	265,526	0%
VRI II	706,111	578,348	82%	893,669	100%	915,407	100%	689,513	98%
VRI III	1,028,709	840,655	82%	806,869	78%	809,935	79%	810,179	79%
VRI IV	1,085,332	1,375,138	100%	789,420	73%	836,314	77%	1,066,866	98%
TOTAL	**2,820,152**	**2,794,141**		**2,489,958**		**2,561,656**		**2,566,558**	

NOTE: * There is no variation between the VRI I acres and the VRM I class acres, so potentially all of the acres in each of the alternatives (VRM class I) would continue to retain and preserve the existing character of the landscape (visual values). Alternative B would propose the most acres for VRM Class I, while Alternative A and D would propose the least.

4.3.9 IMPACTS ON FIRE AND FUELS MANAGEMENT

Management actions can affect the frequency and intensity of fire, the cost and complexity of fire suppression or hazardous fuels operations, and the safety of both the public and the firefighters. Impacts are described when management actions have the potential to reduce or increase the risk of fire ignitions, fire spread, or fire intensity. While actions like prescribed fire have obvious direct effects on these attributes, other actions affect them only indirectly. Campfires, for example, pose an indirect risk of accidental ignition because the fire does not always spread and only does so when left unattended; and while technologies like spark arrestors have reduced the tendency of OHVs to ignite fire, the operation of internal combustion engines over dry vegetation is also a potential indirect source of accidental ignitions.

This analysis of impacts on the fire and fuels management required certain assumptions:

- Fire is an important, natural disturbance in many of the ecological systems found in the desert Southwest.
- Fire will not typically carry in southwestern grasslands having less than 600 pounds per acre of herbaceous fuel (Wright 1980).
- A direct relationship exists between the density of use of public land and the frequency of human-caused fires.
- An objective of Habitat Management Plans and Coordinated RMPs would be to restore native plant communities by reducing encroachment of woody species. Restoration of native plant communities also would restore historic fire regimes.
- Vegetation communities would respond to disturbances according to their corresponding state-and-transition model.

Under all alternatives, impacts on wildfire and fuels management are not anticipated as a result of implementing management actions for the following resources and resource uses: paleontology, visual resources, fluid-minerals, locatable minerals, and saleable minerals.

4.3.9.1 Impacts on Fire and Fuels Management Common to All Alternatives

Camping and campfire restrictions in the Cornudas Mountains ACEC and the Alkali Lakes ACEC would continue to reduce the risk for human-caused ignitions on a total of 7,200 acres.

Continuing management to comply with the *New Mexico Standards and Guidelines* for grazing administration would continue to promote retention of existing vegetation communities on a landscape scale, resulting in a corresponding retention of Fire Regime Condition Class ratings throughout the *Planning Area*. Under the *New Mexico Standards and Guidelines,* the potential for extreme alterations in the frequency, size, and severity of wildfire due to changes in vegetation communities would not occur over the life of the plan.

In areas of sensitive resources (special status species habitats, cultural sites, paleontological sites, fragile soils, riparian areas), wildfire suppression and hazardous fuels operations managers may alter their suppression strategies or fuel reduction techniques. When BLM determines that wildfire suppression techniques involving heavy surface disturbance—such as fire-line construction—would cause greater harm to a sensitive resource than the fire itself, the BLM may employ Minimum Impact Suppression Techniques (MIST). MIST techniques have the potential to affect fire size. For example, where sensitive resources limit fire-line construction, MIST techniques might favor letting a fire burn to a natural fuel or topographical break, resulting in a larger fire. MIST techniques would not increase risk to firefighters or public safety.

Smoke will be managed from prescribed fire and wildfires based on the New Mexico Smoke Management Program. Livestock grazing would continue to reduce fine fuels in allotments. Vegetation treatments that improve rangeland condition could restore the potential for fires to spread into or through treatment areas. Reducing fuels in wildland urban interface areas would continue to reduce the risk to public safety from wildfire in the *Planning Area*. These measures would be implemented in localized areas over the life of the plan as part of an adaptive management strategy.

Construction and operation of solar energy facilities in the Afton SEZ would have no impact on fire and fuels management because of the sparseness of vegetation, and what little vegetation may be on site, would be removed during construction. Wind energy facilities are usually in upland environments where there is likely to be more and larger types of vegetation. In these cases protective measures from wildland fire such as fuel breaks around certain structures may be necessary.

4.3.9.2 Impacts of the Alternatives on Fire and Fuels Management

4.3.9.2.1 Alternative A Impacts on Fire and Fuels Management

Vegetation: There would be a moderate potential to restore or maintain the historic fire regime of infrequent, low-intensity fires over the long-term in localized areas from the vegetation treatments that reduce shrub encroachment into grasslands of the *Decision Area*.

The extent of vegetation treatment proposed for the *Decision Area* is unknown at this time; however, in the last 4 years, an average of approximately 63,000 acres of treatments using all methods have been completed annually. It is expected that similar amounts would be treated in the future. In treated areas,

the initial dieback of shrubs would temporarily reduce the amount of surface fuels available for wildfire in localized areas. In following growing seasons, treatment areas could respond with an increase in herbaceous vegetation that has a greater potential to carry wildfire than the previous shrub community. The increase in fine fuels could result in a potential increase in fire size and frequency because fine fuels tend to carry wildfire better than shrub communities. There could be a minor increase in fire intensity where shrub skeletons remain on the landscape. Treatments would increase the amount of surface fuel relative to pretreatment conditions because an increase in herbaceous vegetation would combine with the skeletons of dead shrubs. Woody remains of creosote, for example, take about 60 years to decay beyond the point of recognition (McAuliffe 1988). The long-term reduction of shrubs and increase in herbaceous vegetation in treated areas would increase the potential for larger, more frequent wildfires of increased intensity in localized areas of the *Decision Area*. Wild or prescribed fire in treatment areas would not threaten key ecosystem components, nor would these fires be likely to threaten the safety of firefighters and the public.

Livestock Grazing: Allotments with activity plans that incorporate fire and fuels treatments would reduce shrub cover and improve forage quality, thereby allowing for the use of fire as a restoration tool.

Comprehensive Travel and Trails Management: Managing 1.64 million acres as open to cross-country OHV use would continue to elevate the risk for human-caused ignitions. In addition, there would continue to be a minor risk of accidental ignitions from OHV use in the 72,000 acres managed as limited to designated routes and the 1,019,000 acres in Doña Ana County as limited to existing routes. Conversely, closing 43,000 acres will continue to limit the sources of human-caused ignitions to a localized area.

Recreation and Visitor Services: Areas managed as SRMAs could indirectly reduce human-caused ignitions because SRMAs could structure recreational use. Structuring recreational use could increase the potential for BLM to communicate wildfire awareness to the public at interface areas such as trailheads and parking lots.

Lands and Realty: Utility corridors and rights-of-way could indirectly decrease fire size if linear swaths of vegetation are cleared for maintenance or access roads within the corridors. Linear areas of cleared vegetation would create fuel breaks across which wildfire could be stopped or slowed.

4.3.9.2.2 Alternative B Impacts on Fire and Fuels Management

Vegetation and Woodlands: In contrast to Alternative A, the effects of all habitat restoration under this alternative would occur only over the long-term because passive restoration treatments would take more than 5 years to sufficiently alter vegetation communities. BLM anticipates that the overall effect on fire and fuels management on the vegetation treatments would be minor. The exclusion of fire as a tool for restoration would reduce the average number of acres burned each year relative to Alternative A. Also, the exclusion of other active techniques to restore vegetation would reduce the potential to restore the native plant community and the corresponding fire regime.

In localized areas, commercial and noncommercial harvest in woodlands would indirectly help maintain, or in some cases restore, the historic fire regime by reducing woody species and promoting the herbaceous species necessary to carry fire through these vegetation types. As a result, the potential for wildfire ignition and spread in localized areas could increase slightly relative to Alternative A. In the event of an ignition, fire severity would likely be lower relative to Alternative A due to a reduction in woody fuel types.

The indirect, long-term impacts on fire and fuels management from passive restoration under this alternative would reduce the short-term potential for wildfire ignition and spread relative to Alternative A because areas of high shrub cover would not produce the fine fuels necessary to carry wildfire. While fire would occur less frequently under this alternative relative to Alternative A, fire severity could be greater in localized areas of dense shrub or tree cover because these areas may be capable of carrying wildfire through the plant community canopy. Wildland and prescribed fire would not be used as a restoration tool, and due to the reduced potential for herbaceous vegetation growth, there would be slightly less potential to restore the historic fire regime associated with Chihuahuan semi desert grassland communities under this alternative as compared to Alternative A.

Livestock Grazing: Reducing AUMs by 25 percent on 950,000 acres that have limited restoration potential would increase fine fuels which may lead to an increase in fire frequency in those areas compared to Alternative A. Increased fire frequency may push these areas into an unstable state with elevated rates of erosion, invasive species establishment, and surface-water runoff.

Comprehensive Trails and Travel Management: OHV use would have similar impacts on the potential for accidental ignitions to those described under Alternative A, but there would be less potential for accidental ignition because fewer areas would be open to cross-country travel and more areas would be entirely closed. There would continue to be a risk of accidental ignitions from OHV use in 38,966 acres designated as open to cross-country motorized vehicle travel. Meanwhile, closing 259,891 acres to motorized vehicle use would reduce the potential sources of accidental ignitions there.

Recreation and Visitor Services: The establishment of SRMAs would have similar impacts on those discussed under Alternative A, but the potential for the BLM to communicate wildfire awareness at public interface areas would increase because more SRMAs are proposed. The overall reduction in the number of human-caused ignitions would be minor as a result of fire awareness communications at SRMAs.

Lands and Realty: Utility corridors would have the same impacts on fire and fuels management as those discussed under Alternative A. There would be a greater potential for utility corridors to act as firebreaks if vegetation is cleared to accommodate utility lines on 150,000 acres (8 times greater than Alternative A).

4.3.9.2.3 Alternative C (Preferred Alternative) Impacts to Fire and Fuels Management

Vegetation and Woodlands: Treatments to restore vegetation communities could include the full range of passive and active treatments which would accelerate the restoration of native plant communities in localized areas relative to Alternative B. Active treatments such as the use of herbicides to control shrub encroachment would have the same impacts as those described under Alternative A. The extent that fire would be used would be evaluated on a case-by-case basis. Mechanical treatments could reduce fuels in localized areas over the short-term, depending on the treatment type. Cutting and pile burning, for example, would reduce fuels over the short-term and help to restore the historic fire regime in localized areas. As with chemical treatments, mechanical treatments may cause a minor increase in fire size over the long-term because treated areas would respond with an increase in herbaceous vegetation.

The potential for using fire as a restoration tool, and the accelerated restoration of grasslands from mechanical treatments could result in a minor, short-term increase in the frequency of fire in localized areas relative to Alternative B. This increase would not threaten resource values or public safety.

Livestock Grazing: A watershed-based strategy would improve the BLM's ability to effectively adjust livestock forage use where ecosystem function warrants it. Alternative C improves fire and fuels management in priority watersheds, whereas Alternative B only enhances conditions in sites with limited restoration potential.

Comprehensive Trails and Travel Management: OHV use would have similar impacts on the potential for accidental ignitions as those described under Alternative B, since vehicle use designations would be virtually the same.

Recreation and Visitor Services: The designation of SRMAs and ERMAs would have the same impact on the potential for human-caused ignitions in Doña Ana County as Alternative B. In addition, recreation management area designations in 151,410 acres could further reduce the potential for human-caused ignitions. The BLM anticipates that the relative reduction in human-caused ignitions as a result of fire awareness communications of public interface areas would be minor.

Lands and Realty: Utility corridors potentially could act as firebreaks, as discussed under Alternative A. However, there would be greater potential for fire to be stopped or slowed under this alternative because there would be 209,000 acres of utility corridors.

4.3.9.2.4 Alternative D Impacts on Fire and Fuels Management

Vegetation and Woodlands: In contrast to Alternative C, increases in forage would be allocated to livestock grazing. This would promote retention of existing fuel types and distributions in livestock grazing allotments. It would be more difficult to restore the historic fire regime compared to Alternative C because the livestock allocation would reduce the potential for fine fuels to carry wildfire, even in restored areas. The relative reduction in fire frequency and size relative would be minor compared to Alternative B and would be negligible compared to Alternative A.

Livestock: The impacts would be the same as those described under Alternative A.

Comprehensive Trails and Travel Management: OHV use would have similar impacts on the potential for accidental ignitions to those described under Alternative B, but there would be more potential for accidental ignition because fewer areas would be closed to cross-country travel.

Recreation and Visitor Services: Under Alternative D, there would be a greater potential for public interface areas in all three counties. SRMA and ERMA designations would increase to 193,573 acres. However, the relative increase in human caused ignitions as a result of potentially greater numbers of recreationists in these areas compared to the other alternatives would be minor.

Lands and Realty: Impacts from utility corridors would be similar to those described under Alternative C.

4.4 IMPACTS ON RESOURCE USES

4.4.1 IMPACTS ON LIVESTOCK GRAZING

This section describes the potential impacts on livestock grazing from the implementation of management actions for other resource programs. Impacts on livestock grazing activities are generally the result of activities that affect forage levels, the ability to construct range improvements, or human disturbance of livestock within grazing allotments that occur with other resource uses.

The analysis is based on the following assumptions:

- All existing leases and permits would be subject to terms and conditions, as appropriate.
- Livestock operators would work toward achieving the *New Mexico Standards and Guidelines* on grazing allotments.
- Construction of range improvements (e.g., fences, pipeline, water wells, troughs, and reservoirs) result in a localized loss of vegetation cover but would be designed to minimize surface disturbance and mitigate potential adverse impacts to other resource values.
- Range improvements would improve livestock management and distribution.
- Although some areas are more suitable for different classes of livestock, the impacts from different classes of livestock would be similar and would not be discussed separately.
- Current trends in livestock market conditions would continue. Livestock values would therefore remain the same as at present.
- Assessments of vegetation-related impacts are based on expectations of normal precipitation during the life of the plan.
- Long-term grazing levels are based on monitoring information, including utilization studies and actual use data.

Activities that lead to surface disturbance would affect forage conditions through changes to the cover, density, and productivity of vegetation. This could increase opportunities for the establishment of noxious weeds and invasive species. Many noxious weeds and nonnative, invasive species are unpalatable to livestock and are not fed upon. This would reduce the amount of forage available to livestock. Conserving vegetation cover, density, and structure through limiting surface disturbance would result in reduced rates of both windborne and waterborne erosion and would result in conserving forage.

4.4.1.1 Impacts on Livestock Grazing Common to All Alternatives

The allocations by alternative of areas closed to grazing as well potential reductions in livestock numbers are shown in Table 4-2 at the beginning of this chapter. Management decisions related to restoration of vegetation on uplands and wetland-riparian areas are expected to meet *New Mexico Standards and Guidelines* and could increase the cover of vegetation and improve species diversity and plant community structure. This also could reduce opportunities for the establishment of noxious weeds and nonnative invasive species. Meeting *New Mexico Standards and Guidelines* could require livestock operators to modify turnout dates, grazing periods, grazing systems, forage utilization levels, exclosures, and livestock conversions. Although these adjustments would help to enhance rangeland conditions and increase long-term forage production, the number of animal unit months available could decrease for some livestock operators.

Limiting surface-disturbing activities would reduce the establishment of noxious weeds and nonnative invasive species. Preventing the occurrences and controlling the spread of noxious weeds and nonnative, invasive species would affect livestock grazing by reducing competition for water and nutrients with native or otherwise desirable plant species, consequently maintaining or improving forage conditions and amount of forage available for livestock consumption. Management decisions that are common to all alternatives and would result in decreased surface disturbance include decisions concerning soil and water, vegetation, fish and wildlife habitat, special status species, visual resources, special management areas, recreational use, energy and minerals, and wilderness characteristics.

Management decisions relating to soil and water, vegetation, fire management, special status species, and wildlife resources generally would serve to enhance vegetation community conditions and indirectly affect livestock grazing by improving forage conditions. Managing soil and water resources to meet site

capability for soil and site stability and hydrologic function, and managing areas needing restoration by allowing them to rest for a minimum of two growing seasons following vegetation or soil treatment, or as indicated by monitoring of treatment objectives, could increase the forage levels and forage quality available for livestock. However, livestock numbers would not be increased as a result of vegetation treatments and increased forage production.

Activities that increase the likelihood of surface disturbance and removal of existing vegetation could impact grazing resources through decreased levels of available forage for livestock. Surface disturbance could also increase the opportunities for the establishment of noxious weeds and nonnative invasive species. This could further impact livestock grazing indirectly by reducing the quality of forage available for livestock. Management decisions allowing recreation, OHV use, fluid-mineral leasing, and mineral material sales (e.g., sand and gravel) generally would result in surface disturbance.

Recreational opportunities resulting in an increased presence of humans could impact livestock grazing through disturbance that could cause animal displacement or injury. Recreation use could also result in damage to range improvements such as fences, pipelines, water tanks, windmills, etc. Under all alternatives, impacts on livestock grazing are not anticipated as a result of implementing management actions for air quality or paleontology.

4.4.1.2 Impacts of the Alternatives on Livestock Grazing

4.4.1.2.1 Alternative A Impacts on Livestock Grazing

Special Designations: Managing 39,000 acres to meet VRM Class I objectives and designating 90,000 acres as ACECs could reduce the area where surface-disturbing activities occur, which would indirectly help to maintain the quantity of forage. However, this could restrict the location or extent of rangeland improvements indirectly reducing the potential increases in the quantity of forage.

Soil and Water: Prioritizing critical soils on slopes of 0 to 10 percent and greater than 10 percent for grazing management and land treatments could affect livestock grazing by requiring operators to make adjustments to grazing practices. Managing critical soils on slopes of 0 to 10 percent for land treatments could improve forage levels and forage quality.

Comprehensive Trails and Travel Management: Surface disturbance associated with managing 1.64 million acres as open to cross-country OHV use could reduce forage quality and quantity and result in changes to livestock distribution.

Recreation and Visitor Services: Managing 69,000 acres as SRMAs could result in localized surface-disturbance from recreation activities, and cause the destruction or trampling of vegetation that could reduce forage quantity and quality. In addition, managing 2.21 million acres to meet VRM Class III and IV objectives could allow surface-disturbing activities that result in short-term reductions in forage levels available for livestock and forage quality in site-specific areas.

Lands and Realty: Restricting uses on the public land such as rights-of-way avoidance and exclusion areas and closing areas to mineral material sales would reduce or eliminate surface disturbance on those areas, and thereby maintain existing forage for livestock consumption. This impact would be relatively substantial since these restrictions cover approximately 28 percent of the *Decision Area*.

Minerals: Managing 3.6 million acres as open to fluid-minerals leasing with standard lease terms and conditions would result in localized surface disturbance. Localized impacts during construction activities

would be short-term; however, long-term fluid-mineral development could reduce the quantity of forage available for livestock in localized areas. Disturbed areas would not likely be completely reclaimed either naturally or by reseeding resulting in barren patches or noxious weed growth and the loss of forage in localized areas.

4.4.1.2.2 Alternative B Impacts on Livestock Grazing

Special Designations: Excluding new land uses and mineral leasing in WSAs, and ACECs would reduce both surface-disturbing activities and the opportunities for establishment of noxious weeds and invasive species in these areas. Indirectly this could improve forage quality and reduce conflicts between human activities and livestock operations. In the long-term, this could result in increased forage quantity and quality compared to Alternative A.

Vegetation and Woodlands: Impacts would be similar to Alternative A except only passive methods for restoration could reduce the extent of areas available for livestock grazing, if areas where restoration is needed are designated as closed to grazing. Also, closing developed recreation sites, unallotted areas, and non-permitted areas to livestock grazing would result in localized reductions in the areas available for livestock grazing. This would minimally reduce the total area available for livestock grazing and could reduce livestock operator flexibility compared to Alternative A.

Under Alternative B, increases in forage production that result from soil and vegetation restoration activities would be allocated for wildlife and watershed functioning. Indirectly this could increase forage production and could improve forage quantity and quality for livestock in the long-term which could improve animal health, calf/lamb crop percentages, and weaning weights. Lower use levels resulting from increased plant productivity would occur without reducing livestock numbers; therefore, more residual forage would be available during times of drought relative to Alternative A.

Comprehensive Trails and Travel Management: Closing 260,000 acres to OHV use would help maintain existing vegetation conditions and could improve the rangeland health and watershed function by limiting surface disturbance. Reducing the amount of acres open to OHV use and increasing the amount limited to existing and designated routes would decrease the areas where surface-disturbing activities could occur compared to Alternative A and would reduce the amount of direct disturbance and harassment to livestock. Closing vehicle routes affecting riparian and arroyo habitats could improve grazing resources by improving vegetation cover, density, and production. This could indirectly increase forage quality and reduce the opportunities for establishment of noxious weeds compared to Alternative A.

Recreation and Visitor Services: SRMAs would be designated on 83,000 acres, an increase of 13,000 acres compared to Alternative A. This could increase localized surface disturbance from recreation activities, resulting in a decrease in forage available for livestock grazing. However, this could reduce localized surface disturbance from recreation use in other areas if recreation relocated to SRMAs. This could help maintain forage quantity and reduce areas where there were conflicts between uses relative to Alternative A.

Lands and Realty: Excluding 920,000 acres from new land uses and mineral leasing would reduce both surface-disturbing activities and the opportunities for establishment of noxious weeds and invasive species in these areas. Indirectly this could improve forage quality and reduce conflicts between human activities and livestock operations. In the long-term, this could result in increased forage quantity and quality available for livestock compared to Alternative A.

Renewable Energy: Grazing would be excluded from the Afton SEZ as provided for in the BLM grazing regulations (43 CFR Part 4100). This would include reimbursement of the permittee for the portion of the value for any range improvements in the area removed from the grazing allotment. The impact of this change in the grazing permits would depend on several factors, including: (1) how much of an allotment the permittee might lose to development, (2) how important the specific land lost is to the permittee's overall operation, and (3) the amount of actual forage production that would be lost.

Solar energy development within the Afton SEZ would affect portions of six grazing allotments. If the SEZ were fully developed, two allotments would be reduced by 14 percent and 61 percent of their respective AUMs. In addition, the SEZ would split the allotments and livestock would most likely have to be transported from one side of an allotment to the other. Development within the SEZ would impact less than 2 percent of the AUMs allocated to the four remaining allotments. According to current grazing regulations, following the issuance of two year Waiver Notices for each allotment the grazing permits would be reviewed and revised as necessary.

There would be minimal impact to livestock grazing within the *Decision Area* from solar energy development within the Afton SEZ. According to records from BLM's billing system, Rangeland Administration System (RAS), there were 377,389 billed AUMs in 2010 (Table 3-28). Full development of the SEZ would remove 1,302 AUMs from livestock forage production representing less than 1 percent of the total billed AUMs within the *Decision Area*.

There would be little impact on livestock grazing from the development of wind energy projects. Livestock could be temporarily displaced during construction of the project and installation of towers and turbines, but in the long-term these areas would most likely still be open to grazing. Small areas including tower sites and new roads would be permanently lost to grazing

Minerals: Under Alternative B, areas managed as closed to mineral development activities, locatable minerals (e.g., precious metals and building, decorative, or precious stones), and mineral materials would increase compared to Alternative A.

In the short-term there would be few impacts from oil and gas leasing, exploration, and development since most of the *Planning Area* would be deferred from leasing until a programmatic EIS addressing these activities is prepared in the future. Exploration and development could occur on 52,705 acres; however, these impacts would be isolated and localized due to the nature of and limited amount of leasing. Geothermal leasing, exploration, development, and production could continue on approximately 3.2 million acres open to leasing with stipulations or standard lease terms and conditions. However, such activity would likely be confined to high potential areas along the Rio Grande Valley which would have little impact on livestock grazing in the *Decision Area* overall.

4.4.1.2.3 Alternative C (Preferred Alternative) Impacts on Livestock Grazing

Special Designations: Managing 304,000 acres as ACEC could decrease the areas where surface-disturbing activities could occur. This could decrease the area where rangeland improvement projects could be implemented compared to Alternative A and decrease the area where restrictions occur compared to Alternative B.

Vegetation and Woodlands: Impacts would be similar to Alternative B, except that using both active and passive methods to restore soils, watersheds, and vegetation could improve resource conditions over a greater area and in less time than under Alternative B. Initially allocating forage increases that result from grassland restoration treatments to meet watershed function would impact grazing by improving the quality of the forage available for livestock grazing. Forage produced in excess of the needs for adequate

watershed functioning and for wildlife based on monitoring could increase the amount of forage available for livestock grazing. This could result in a greater increase in the quality and quantity of forage available for livestock compared to Alternatives A and B.

Comprehensive Trails and Travel Management: Closing 20,000 acres and limiting OHV use to designated and existing routes on 99 percent of the *Decision Area* would decrease surface disturbance compared to Alternative A. Impacts would be similar as those described in Alternative B.

Recreation and Visitor Services: Impacts from SRMAs would be the same as those under Alternative B.

Lands and Realty: The effects of excluding 343,000 acres from new land uses and mineral leasing would be similar to Alternative B but on a one third of the acreage.

Renewable Energy: Impacts of solar energy development in the Afton SEZ and the impacts of wind energy projects would be the same as those described under Alternative B.

Minerals: Impacts would be the same as those described for Alternative B since areas closed, open, and deferred from leasing would be essentially the same.

4.4.1.2.4 Alternative D Impacts to Livestock Grazing

Special Designations: Impacts of excluding new land uses and mineral leasing in WSAs, ACECs would be similar to Alternative A. Managing 265,526 acres to meet VRM Class I objectives, including ACECs and WSAs, could decrease the areas where surface-disturbing activities could occur. This could decrease the area where rangeland improvement projects could be implemented compared to Alternative A and decrease the area where restrictions occur compared to Alternatives B and C.

Vegetation and Woodlands: Impacts of vegetation restoration would be similar to Alternative C, except that using only active methods to restore soils, watersheds, and vegetation could indirectly decrease the quantity of forage available for livestock. In addition, restrictions on livestock grazing in developed recreation sites and areas within 9 miles of historic or currently occupied desert bighorn sheep habitat could reduce the flexibility of livestock grazing and could result in an overall reduction in the quantity of available forage. This could decrease the area and amount of forage available for livestock grazing compared to Alternatives A and C and could result in the same impacts as Alternative B.

Increases in plant productivity due to soil and vegetation treatments would be allocated for livestock use. This could increase the amount of forage available for livestock compared to Alternatives A and B; however, there would be no increase in livestock numbers as a result of the increased forage. In treated areas, limiting restoration activities to active methods only could result in localized reduction in forage quantity compared to Alternative C.

Comprehensive Trails and Travel Management: Closing 17,000 acres and managing 99 percent of the rest of the *Decision Area* as limited to designated routes for vehicle use would decrease surface disturbance compared to Alternative A, and have impacts similar to Alternatives B and C.

Recreation and Visitor Services: Impacts would be the same as those described in Alternative C but there would be 42,000 more acres in SRMAs and ERMAs.

Lands and Realty: Alternative D excludes 308,000 acres from new land uses so impacts would be similar to Alternative C.

Renewable Energy: Impacts in the Afton SEZ and impacts of wind energy projects throughout the *Decision Area* would be the same as those described under Alternative B.

Minerals: Increasing the area managed as open to mineral material disposal and locatable mineral entry could increase localized surface disturbance. Impacts would be the same as those described for Alternative B since areas closed, open, and deferred from leasing would be essentially the same.

4.4.2 IMPACTS ON COMPREHENSIVE TRAILS AND TRAVEL MANAGEMENT

The analysis of effects on trails and travel management, including access within the *Decision Area* is focused on the loss or gain of access for motorized and non-motorized (hiking, biking, horseback riding, etc.) surface travel. Impacts are determined by whether or not current access would be changed and the degree to which management would meet the goals and objectives for trails and travel management.

Planning Area ingress and egress are affected by surface travel route closures, limitations, and other management actions limiting access. These include actions that would limit the degree of travel opportunities and the ability to access certain portions of the *Decision Area*. Impacts on opportunities for OHV use are addressed in the Recreation impact analysis (4.4.3).

This analysis describes the degree of access and the extent of usable transportation systems within the *Decision Area*. Increased access by way of new route designations, route maintenance, and the opening of closed areas affects surface travel. Changes in access to inholdings and land or right-of-way acquisition also affect surface travel. Analyses are based on the short- or long-term effects from changes on the places where OHV travel can occur and on the routes that are available for motorized travel.

The following assumptions were used when assessing the impacts on trails and travel management:

- During planning for future projects, the BLM would assess all proposed actions for site-specific effects to avoid impacts to routes that could preclude their future use within the *Planning Area*.
- Changes to travel management, as outlined in each alternative, would be consistent with the other allocations, allowable uses, and management actions under that particular alternative.

Impacts on transportation and access would not be anticipated from implementing management actions for the following resources: air quality, vegetation, wildland fire management, cultural resources, visual resources, forest, woodland and plant products, minerals and energy, and special designations.

4.4.2.1 Impacts to Comprehensive Trails and Travel Management Common to All Alternatives

The designations of travel management areas are shown for each alternative in Table 4-2 at the beginning of this chapter. Management actions that limit or prohibit surface disturbance to maintain *New Mexico Standards and Guidelines* or to protect cultural or paleontological resources could limit or eliminate access to some areas. Special status species and fish and wildlife actions that limit or prohibit disruptive activities within habitats also could limit or eliminate access to some areas. However, roads developed to facilitate mineral exploration and development would increase access to portions of the *Decision Area*, if these are available for public use.

4.4.2.2 Impacts of the Alternatives on Comprehensive Trails and Travel Management

4.4.2.2.1 Alternative A Impacts on Comprehensive Trails and Travel Management

Comprehensive Trails and Travel Management: Managing 1.64 million acres as Open to OHV use would allow year-long motorized use anywhere on or within these open areas (43 CFR 8340.0-5). This would (1) improve the opportunities for motorized vehicle users who prefer unrestricted, cross-country riding and access, (2) reduce the opportunity for individuals seeking a quieter and primitive recreation experience, and (3) increase the opportunity for conflicts between motorized and non-motorized users.

Managing approximately 272,000 acres as limited to designated routes and 879,000 acres as limited to existing or established routes would prohibit cross country travel and (1) reduce the opportunity for OHV users who prefer unrestricted, cross country riding, (2) continue to provide OHV riding opportunity and access to the thousands of miles of designated and/or existing routes, (3) increase the opportunity for individuals seeking a more quiet and primitive recreation experience, and (4) reduce the opportunity for conflicts between motorized and non-motorized users or travelers.

Lands and Realty: Land tenure would improve accessibility to public land where it is needed and could not be obtained otherwise. In addition, acquiring legal access could facilitate travel by creating more contiguous public land. Disposing of up to 213,199 acres of land (7.5 percent of the *Decision Area*) could reduce motorized access for the public in the long term. Many of these areas are near urban and low density residential development making them easy access for OHV use. These readily available areas could be lost through land disposal and subsequent commercial or residential development. Managing 43,000 acres in special management areas as closed to OHV use also would reduce access for motorized means but this would be a negligible impact in comparison to the rest of the routes open to OHV use.

4.4.2.2.2 Alternative B Impacts on Trails and Travel Management

Comprehensive Trails and Travel Management: Travel management plans would be prepared for the entire *Planning Area*. Preparing travel management plans would result in a network of designated routes to facilitate management of all travel, (motorized, mechanized, foot, horseback, etc.) in the *Decision Area*. The public would readily know which routes would be available for which types of use and this in turn would reduce cross-country use and use of non-designated routes.

Managing 125,716 acres as closed to OHV use in special management areas (WSAs and ACECs) would reduce the area where motorized access could occur without the presence of a route.

Designating some 39,000 acres as open to vehicle use would eliminate cross-country travel in the rest of the *Decision Area*. Designating and managing most of the *Decision Area*, 98.5 percent, as limiting OHV use to designated or existing routes would impact OHV users who seek unlimited motorized access.

Lands and Realty: Not placing a priority on acquiring access to public land could result in areas of public land that are not accessible by motorized vehicles or non-motorized means. In the long-term, this could decrease access compared to Alternative A. Less area, 38,000 acres would be identified for disposal under Alternative B as compared to Alternative A. More public land would continue to be available for vehicle use near urban and semi-urban areas. These could become de-facto “play areas” for OHV users.

4.4.2.2.3 Alternative C (Preferred Alternative) Impacts on Trails and Travel

Comprehensive Trails and Travel Management: The impacts of preparing travel management plans would be the same as those under Alternative B. Managing nearly 19,218 acres as closed to OHV use would reduce slightly the area where motorized access could occur. Managing 570,000 acres as limited to designated routes, and 2 million acres as limited to existing routes, would limit cross-country use and use of some routes as compared with Alternative A and could increase motorized access relative to Alternative B. Road closures would be greater than those under Alternative A, and less than those under Alternative B. Designating nearly 42,000 acres as open to OHV use would mean that cross-country travel in the rest of the *Decision Area* would be eliminated. The impacts would be similar to those described under Alternative B.

Lands and Realty: Developing access through new road construction around non-Federal land, land ownership adjustments, or easement acquisition could increase motorized access to public land. This could increase the areas where access could be obtained from willing sellers compared to Alternatives A and B.

Approximately 108,450 of the *Decision Area* would be identified for potential disposal. This could reduce the area where unauthorized OHV use occurs in the wildland urban interface; but otherwise would have no impact on trails and travel management overall.

4.4.2.2.4 Alternative D Impacts on Trails and Travel Management

Comprehensive Trails and Travel Management: The impacts of preparing travel management plans would be the same as those under Alternative B. The potential for impacts from vehicle use would be greater than under Alternative C.

Lands and Realty: Approximately 186,523 acres of the *Decision Area* would be identified for potential disposal. This could reduce the area available for motorized access to a greater extent than under Alternative C and less than Alternative A.

4.4.3 IMPACTS ON RECREATION AND VISITOR SERVICES

This section presents potential impacts on recreation resources, opportunities, settings, and experiences. Impacts on OHV or other motorized travel as recreational uses are addressed in this section; however, impacts related to OHV and travel management are also discussed in Section 4.4.2.

Impacts on recreation are identified if the management actions would result in a (1) changes to public access, (2) changes in the availability of recreation opportunities and pursuits, (3) compromised public health and safety, or (4) changes to the recreational setting or experience. An effect on the recreational setting might occur if changes to motorized access, use levels, natural vegetation and landform, or noise would influence the character or availability of recreational opportunities in an area. The following assumptions were used when assessing the impacts on recreation and visitor services:

- Demand for recreational opportunities would increase, as would visitor use.
- There would be sufficient opportunities to meet the demand of non-motorized recreation (e.g., hiking, mountain biking, and equestrian).
- The incidence of resource damage and conflicts between recreationists involved in motorized and non-motorized activities would increase with increasing use of public land.
- Demand for special recreation permits would increase during the life of the plan.

- Motorized vehicle use and mechanized vehicle use would be limited to authorized routes where roads or trails are designated.
- Adequate staffing would be available for law enforcement, visitor services, and recreation use supervision.

4.4.3.1 Impacts on Recreation and Visitor Services Common to All Alternatives

Under all alternatives, special and extensive recreation management areas would be designated and managed (see Table 4-2). The number and size of areas varies by alternative yet each would provide a more structured recreation experience with various levels of facilities resulting in a particular type of experience outcome. The remainder of the *Decision Area* would be open for any and all types of dispersed recreation for which BLM land is well known. This would provide a more satisfactory recreation experience and outcome for those who prefer to enjoy the outdoors in a more natural, less structured environment rather than within the managed recreation areas.

The presence and condition of natural and cultural resources and their vulnerability to degradation can influence management decisions on how much recreational activity can occur while sustaining the resources for non-recreational uses or for use by future generations. Resources (such as gems and minerals, and fossils, as well as dead or downed wood) may provide recreational opportunities such as rockhounding, and making campfires; but also could pose visitor safety concerns such as unstable mine conditions or fuel for wildfire. Some types of extractive land uses allowed on public land (such as grazing or mining) may compete with recreational uses or may affect the setting in which recreation occurs. The availability of motorized access via established roads and trails directly influences the availability of recreational opportunities for OHV users or others motorized recreation activities.

The construction of linear rights-of-way could create new vehicle access for recreational users. Development of utilities would affect the quality of the recreation setting for existing dispersed recreation activities if there are increases in motorized travel, changes to scenic quality, or more visitors. However, potential impacts on the recreational setting and potential conflicts with recreational use would be mitigated on a site-specific basis through right-of-way terms and conditions that would be identified during the land use authorization process.

Short-term closures of recreation areas and facilities could occur during fire management or fire suppression activities, which would temporarily limit recreation opportunities. However, managing fire suppression in areas with high resource values and recreation systems or facilities would help maintain and protect recreation systems or facilities and opportunities in the long-term. Wildland fire could improve wildlife habitat and hunting and viewing opportunities over the long-term as areas are restored and vegetation recovers to a desired state.

The influence of ranching and grazing on the recreational setting would continue, particularly from range improvements, utilization of forage, and presence of livestock. Potential conflicts between those uses and recreation could occur. Conversely, livestock grazing activities and rangeland improvements provide opportunities for sight-seeing recreation opportunities.

Recreational opportunities in localized areas could be reduced if recreational use is found to threaten special status species populations or restrictions on access are necessary to achieve habitat management goals. There also could be restrictions on recreational opportunities in localized areas where there are threats to the public safety, such as mining sites. Noticeable changes in the recreation settings visual

character near mining activities would occur on mining claims. Site-specific mitigation measures identified in subsequent NEPA analysis would reduce these affects.

There would be no impacts to outdoor recreation and visitor services from developing existing oil and gas leases or from issuing and developing new geothermal leases because of the few existing leases and the localized nature and small footprint of development of either existing leases or new geothermal leases.

4.4.3.2 Impacts of the Alternatives on Recreation and Visitor Services

4.4.3.2.1 Alternative A Impacts on Recreation and Visitor Services

Special Designations: Nearly 90,000, acres of ACECs would help maintain the current recreational opportunities available in these areas. Although ACECs are not designated specifically for recreational purposes, there are many types of recreational opportunities available such as, historical and cultural sightseeing, spectacular scenic viewing opportunities, and wildlife viewing. Managing these areas to protect relevant and important values from irreparable harm helps to also maintain the primitive and natural settings for the recreational enthusiast who is seeking solitude, naturalness and primitive recreational opportunities.

Managing 617,000 acres, including areas designated as scenic ACECs, to meet VRM Class I and II objectives would protect the scenic quality by restricting landscape change, which would maintain and enhance the recreational experience.

Comprehensive Trails and Travel Management: Managing approximately 1.64 million acres as open to cross-country OHV use could reduce the quality of the setting for dispersed or primitive recreation from the degradation of the natural conditions (e.g., erosion or vegetation damage). Conversely keeping that acreage open for OHV use would maintain existing opportunities for those who enjoy unrestricted motor vehicle access. Managing 1.12 million acres as limited to existing or designated routes would preserve opportunities for motorized recreation on established routes and could reduce conflicts with non-motorized recreation uses.

Closing nearly 43,000 acres to OHV use would eliminate opportunities for OHV use in these areas, but these areas would remain available for non-motorized recreation. This could reduce opportunities for OHV travel and camping in remote areas but could reduce conflicts between motorized and non-motorized users and enhance the experience associated with non-motorized recreation activities.

Recreation and Visitor Services: The two SRMAs in Doña Ana County (Doña Ana Mountains and Organ Mountains) totaling 59,844 acres would maintain the existing outdoor recreation opportunities and experiences in and near the Las Cruces area by addressing recreational user conflicts and potential resource damage, by providing a wide range of developed and dispersed recreational opportunities that continue to contribute to meeting recreational demands in Doña Ana County. These two SRMAs offer outstanding recreational opportunities for hiking, rock climbing, camping, backpacking, hunting, sightseeing, photography, and observing wildlife. When compared to Alternatives B, C and D, Alternative A does not address the growing recreational demands and user conflicts throughout the rest of the *Planning Area* (Otero and Sierra Counties).

Lands and Realty: Acquiring legal access to public land that currently does not have public access could expand the public land base available for dispersed recreation opportunities. Access would only be pursued through willing landowners. If willing landowners are not present, then either the access would remain unavailable to the public or alternate locations for access (from other willing landowners) could be

pursued. In Doña Ana County, access would be developed in four areas through new roads, landownership adjustments, or easement acquisitions and an emphasis would be placed on vehicular and pedestrian access. This could increase available public land for recreation and would improve and enhance recreation opportunities.

Minerals: Renewable energy development and mineral resources exploration and development could have localized impacts on recreation by displacing users to other areas or by creating noise that could diminish the settings for dispersed recreation in areas of relative naturalness and primitive character.

4.4.3.2.2 Alternative B Impacts on Recreation and Visitor Services

Special Designations: Managing WSAs as interim VRM Class I and managing Scenic ACECs as VRM Class I would help protect scenic quality over some 343,000 acres. Any development in these areas would have to be unnoticeable which would preclude most surface disturbing projects.

Vegetation and Woodlands: Using passive restoration methods for vegetation and watershed treatment could help maintain natural settings, but it could displace recreationists. For example, to improve vegetation and watershed conditions, trails and camping areas may have to be closed temporarily or permanently. Indirectly and in the long-term, this could decrease the overall area available for recreation use compared to Alternative A.

Fish and Wildlife Habitat: Management of fish and wildlife habitat would include priorities for managing terrestrial, aquatic, and riparian habitats. Protecting key habitats would improve the opportunity and experience for both consumptive and non-consumptive recreational enjoyment of wildlife. However, habitat enhancement could exclude recreationists through use limitations in site-specific areas; this also could be a long-term impact depending upon the sensitivity of the area.

Special Status Species: Special status species habitat management could improve certain recreational pursuits, such as birding and wildlife viewing in general. This would increase recreation opportunities and experiences compared to Alternative A.

Visual Resources: Managing over 894,000 to meet VRM Class II objectives would increase the area where mitigation for affect to visual resources would apply. This could help maintain outdoor recreation settings and, in the long-term, could improve the experience for recreation users seeking a natural landscape compared to Alternative A.

Comprehensive Trails and Travel Management: Closing 260,000 acres to OHV use and increasing the areas managed as limited to designated routes to 532,000 acres could increase the area where primitive recreation opportunities are available. Indirectly, this could reduce surface disturbance and improve the quality of the recreation setting for people seeking dispersed and undeveloped recreation. Conflicts between recreation uses could be reduced in these areas compared to Alternative A. However, reducing the area managed as open to cross-country OHV use to 39,000 acres would reduce motorized recreation opportunities compared to Alternative A. This would impact OHV users who seek unlimited motorized access to public land; however, existing and designated routes would continue to be open to OHV use.

Recreation and Visitor Services: Increasing the SRMA acreage to 83,000 acres (Las Cruces Tortugas, Las Cruces Picacho, Lake Valley and Three Rivers) would improve recreational experiences and settings, when compared to Alternatives A, B and D (refer to SRMAs in Table 2-9). This would provide for additional areas where recreational use is specifically managed with increased guidance for the users (signage, trail development, etc.). This could help reduce localized surface disturbance associated with

concentrated recreation use. Designating two ERMAs totaling 38,954 acres (Aden Hills and Red Sands OHV areas), would have similar impacts as SRMA designation.

Lands and Realty: Acquisition of access to public land would not be a priority, which in the long-term could reduce the types of recreational experiences available to users on public land relative to Alternative A. Acquiring non-Federal land located within ACECs and WSAs from willing sellers would slightly increase the area for recreation opportunities. In the long-term, this could improve the setting and experience, particularly for primitive/unconfined recreation and natural-setting-based uses such as hiking and nature study.

Managing 920,000 acres as exclusion and 109,000 acres as avoidance for right-of-way activities precludes development in these areas and would benefit recreation opportunities, primitive and unconfined recreation activities, and enhance the experience of users seeking this type of opportunity.

Minerals: Increasing the area managed as closed to mineral development and recommending areas for withdrawal from mineral entry could reduce surface disturbance. This could improve the recreation setting but could reduce opportunities for rock and mineral collecting compared to Alternative A.

4.4.3.2.3 Alternative C (Preferred Alternative) Impacts on Recreation and Visitor Services

Special Designations: The impacts of designating 304,000 acres for ACECs would improve the quality of the recreation setting compared to Alternative A and reduce this effect relative to Alternative B.

Vegetation and Woodlands: The use of passive and active techniques for restoration and management of vegetation and watershed would provide greater management flexibility than Alternative B. Impacts to recreation facilities would potentially be shorter in duration.

Fish and Wildlife Habitat: Alternative C wildlife decisions would have similar impacts as those in Alternative B.

Special Status Species: The impacts of Alternative C would be the same as under Alternative B but on fewer acres.

Visual Resources: Increasing the area managed to meet VRM Class I objectives to 271,405 acres, including WSAs, would help protect scenic quality over a larger area compared to Alternative A and reduce this area slightly compared to Alternative B. This would help maintain recreation experiences and settings.

Comprehensive Trails and Travel Management: Closing 19,000 acres to OHV use could decrease the area where primitive recreation opportunities are available and potentially increase conflicts between users in these areas compared to Alternatives A and B. Increasing the area managed as open to cross-country OHV use to 42,000 acres would slightly increase motorized recreation opportunities compared to Alternative B. This could reduce opportunities for non-motorized recreation experiences compared to Alternative A.

Recreation and Visitor Services: Designating and managing three ERMAs in the *Planning Area* totaling 68,407` acres (Aden Hills OHV, Elephant Butte, and Red Sands OHV) would have similar impacts as SRMA designation and management. Compared to Alternative B, Alternative C proposes more acreage for ERMA management meaning there would be less concentration of visitors and would offer more recreational opportunities and experiences for unconfined types of recreation such as primitive, non-motorized, or motorized.

Lands and Realty: Using all available methods to obtain legal public or administrative access from willing landowners would improve the recreational experience by improving access to public land. This would increase the area of recreation opportunities on public land compared to Alternatives A and B.

Managing 343,000 acres as exclusion and 423,000 acres as avoidance for right-of-way activities would affect recreation opportunities, settings, and experiences. Reducing development in these areas could increase opportunities for primitive/unconfined recreation activities and could enhance the experience of users seeking this type of recreation opportunity compared to Alternative A, but reduce these experiences compared to Alternative B.

4.4.3.2.4 Alternative D Impacts on Recreation and Visitor Services

Special Designations: Impacts of special designations would be similar to Alternative A. This could reduce the quality of the recreational setting compared to Alternatives B and C.

Vegetation and Woodlands: Allocating forage increases for livestock could affect recreational pursuits such as hunting and wildlife viewing in site-specific areas. If the allocation of forage altered the distribution of game or other wildlife species, this would change recreation settings compared to Alternatives A, B, and C.

Fish and Wildlife Habitat: The decreased emphasis on key wildlife habitats in Alternative D as compared to Alternatives B and C would reduce opportunities for recreational enjoyment of wildlife.

Special Status Species: Impacts would be the same as those described under Alternative A.

Visual Resources: Visual resource impacts on Recreation would be similar to Alternative C.

Comprehensive Trails and Travel Management: Closing 17,485 acres to OHV use could decrease the area where primitive recreation opportunities are available and increase conflicts between users compared to Alternatives A, B, and C.

Recreation and Visitor Services: Increasing the SRMA acreage in the *Planning Area* to 83,233 acres (Las Cruces Tortugas, Las Cruces Picacho, Lake Valley, Three Rivers, Talavera and Tularosa Creek) would improve the recreation experience and settings compared to Alternatives A, B and C. Increasing the ERMA acreage in the *Planning Area* to 109,745 acres (Aden Hills OHV, Caballo Mountain, Elephant Butte, and Red Sands OHV) would have similar impacts as the SRMA designation and management. Compared to Alternatives B and C, Alternative D proposes more acreage for ERMA management meaning there would be less concentration of visitors in the *Planning Area* and there would be more recreational opportunities and experiences for unconfined types of recreation such as primitive, non-motorized, or motorized recreation.

Lands and Realty: Increasing the areas available for disposal to over 186,000 acres could reduce the amount of public land available for recreational use. This could result in an increase in recreational opportunities on public land compared to Alternative A, but this effect could decrease compared to Alternatives B and C.

Allowing surface-disturbing activities could degrade the recreational experience and setting in localized areas. Site-specific mitigation and management could result in a short-term reduction in the areas available for recreation use relative to Alternatives A, B and C.

Managing 453,000 acres as avoidance and 308,000 acres as exclusion for rights-of-way would affect recreation opportunities, settings, and experiences. Reducing development in these areas could increase opportunities for primitive/unconfined recreation activities and could enhance the experience of users seeking this type of recreation opportunity compared to Alternative A but reduce these effects compared to Alternatives B and C.

4.4.4 IMPACTS ON LANDS AND REALTY

The discussion of the effects on lands and realty is limited to the effects on permitted or authorized uses and land tenure adjustments. Impacts on lands and realty actions generally occur when management actions result in loss of land or displacement of a land use or preclude a change that may be warranted to meet National, State, or local needs. The following assumptions were adopted when assessing the impacts on lands and realty actions:

- The demand for rights-of-way authorizations would increase through the life of this plan for systems or facilities: roads, electric transmission lines, pipelines, and communication sites.
- Major utilities would include electric transmission lines that are 115 kilovolts or greater, and gas pipelines that are 10 inches in diameter or larger.
- The BLM would continue to process land tenure adjustments and would continue to evaluate applications for leases, permits, or easements for land uses on a case-by-case basis.
- Existing rights-of-way and communication sites would be managed to protect valid existing rights and may be modified when due for renewal to meet the objectives of the RMP.
- Land users holding rights-of-way may maintain their access at their discretion as it is consistent with the terms of their right-of-way grant.

4.4.4.1 Impacts on Lands and Realty Common to All Alternatives

Management-level decisions to protect fish and wildlife resources and special status species could restrict land use authorizations in localized areas, or could require new systems or facilities to be installed in less than desirable locations to avoid important habitat. In Sierra County, new or renewed land use authorizations along Percha Creek would have to meet BLM's habitat goals to be approved. This could affect facility design and project placement and might require projects to be relocated to other areas.

Land tenure adjustments include acquisition of nonpublic land as well as disposal of public land parcels identified by BLM. Land tenure adjustments resulting in consolidation of public land parcels could facilitate management of the land uses and resources. Allowing criteria-based land tenure adjustments (for land disposals and acquisitions) on a case-by-case basis would accommodate community expansion and development needs. It would also foster the creation of contiguous parcels for improved management, and enable the BLM to obtain parcels that could benefit resource management goals.

Land recommended to be withdrawn from public use would decrease the amount of area available for land use authorizations. Utility corridors would provide opportunities for rights-of-way on lands outside of designated corridors, applications for rights-of-way would be considered on a case-by-case basis through site-specific NEPA analysis.

Impacts on lands and realty from management actions associated with air quality, soil, and watershed management would impose design and sighting requirements on new land use authorizations and on amended or renewed land use authorizations at existing sites. However, the development of mitigation measures, BMPs and standard operating procedures would reduce restrictions on the placement of rights-of-ways, energy supply, utility corridors, or communications sites.

Management decisions to restrict land use authorizations to benefit special status species include requiring site-specific evaluations and clearances to protect Federal and State listed species; minimizing impacts on aplomado falcon habitat from surface-disturbing activities; requiring site-specific mitigation within ¼-mile of known raptor nests and prairie dog towns; and applying seasonal closures or use restrictions to protect special status species habitat. Impacts on lands and realty resulting from these decisions could impose design and sighting requirements on new land use authorizations or on amended or renewed land use authorizations at existing sites within habitat areas.

Excluding right-of-way authorizations would restrict facility placement. Management of WSAs consisting of 32,000 acres in Sierra and Otero counties and 226,000 acres in Doña Ana County would be managed under the terms of the BLM's *Management of Wilderness Study Areas Manual 6330,* which would preclude construction of systems or facilities in the WSAs.

Activities by the military recognized as casual use would, by definition, have no impact on public land. However, if impacts were to occur from such use, the military would be responsible for reclamation and future request for military use would be denied or would have to be authorized as otherwise provided by Section 302 of FLPMA. This would require a longer lead time for BLM to prepare a NEPA document to analyze impacts and approve or disapprove the proposed action.

There would be no impacts to lands and realty from developing existing oil and gas leases or from issuing and developing new geothermal leases because of the few existing leases and the localized nature and small footprint of development. However, parcels of land with active leases or mining claims would not be disposed unless those leases or mining claims were relinquished.

4.4.4.2 Impacts of the Alternatives on Lands and Realty

4.4.4.2.1 Alternative A Impacts on Lands and Realty

Cultural Resources: Management prescriptions for cultural areas under Alternative A could affect facility construction or maintenance and relocate planned facilities. Closure of cultural areas to OHV and other off-road vehicle use (Three River Petroglyph Site and Picnic Area, Rattlesnake Hill, Alamo Mountain, Lone Butte, and Jarilla Mountains) could limit the ability to construct systems or facilities within the areas. As a result, new systems or facilities could be relocated. In addition, lands and realty activities also would be affected by the cultural resource decision that prohibits surface-disturbing activities within ¼-mile of the well-preserved segments of the Butterfield Overland Trail, requiring new and renewed land use authorizations to avoid these segments.

Visual Resources: VRM Class I and Class II areas could restrict land use authorizations by prohibiting the location of new rights-of-way or imposing greater design and sighting requirements on amended or renewed rights-of-way at existing sites on approximately 617,000 acres in the three counties.

Recreation and Visitor Services: In Doña Ana County, SRMAs could affect the disposal of land and right-of-way authorizations. The BLM could allow land disposal compatible uses within the designated SRMAs. The impact would be minimal, since little land allocated for disposal is located within the designated SRMAs (approximately 58,000 acres in Doña Ana County). SRMAs managed for remote and undeveloped recreation could restrict land use authorizations and rights-of-way that alter the desired recreation setting.

Lands and Realty: Under Alternative A, approximately 213,000 acres would be allocated for disposal from BLM administration, which is 7.5 percent of the public land in the *Decision Area*. Acquisitions of

approximately 172,000 could increase the acreage managed by the BLM. The priority for acquisition would be in WSAs, ACECs or other areas with high value resources. Land tenure could be affected by retention of land in all special designation areas, and if adjacent land is acquired from willing sellers for specific ACECs (Organ/Franklin Mountain, Los Tules, Robledo Mountains, Rincon, San Diego Mountain, Three Rivers Petroglyph, Sacramento Escarpment, and Alkali Lakes).

Co-locating rights-of-way within designated corridors could ease the process of their construction and maintenance and management. Under Alternative A, there are four designated corridors providing east-west and north-south opportunities for major utilities. Widths of these corridors are undefined, but are generally restricted by management prescriptions for ACECs. In Doña Ana County, approximately 4,000 acres of land within designated utility corridors are allocated for disposal. If land were to be disposed, BLM would reserve easement across the non-Federal land; however, the BLM would no longer have the authority to authorize rights-of-way or other land use authorizations on the disposed parcels.

Opportunities for rights-of-way would be restricted or prohibited on approximately 532,061 acres of land identified as areas of avoidance or exclusion from lands and realty activities. Allocating 4,000 acres in Sierra and Otero counties and 9,000 acres in Doña Ana County as avoidance areas for rights-of-way could impose design and siting requirements and associated costs on new rights-of-way or on amended or renewed rights-of-way at existing sites. Such requirements could restrict placement or require systems or facilities to be rerouted to avoid these areas. Managing areas as avoidance could indirectly limit future access; delay availability of energy projects by restricting the location of pipelines, transmission lines, and wind and solar projects; create dead zones for communication; or delay availability of communications service. Such requirements also could require communication sites to be installed in locations with more restrictions on accessibility or construction. The designation of approximately 90,000 acres as ACECs in the three counties would restrict land use authorizations in these areas less than 3 percent of the *Decision Area*. As a result of these management prescriptions, new systems or facilities could be rerouted and consequently installed in other locations to avoid special designation areas.

4.4.4.2.2 Alternative B Impacts on Lands and Realty

Soil and Water: Prohibiting surface-disturbing activities to prevent soil movement and loss within watersheds containing 303(d) listed streams could impose design and location requirements on new, renewed, or amended rights-of-way at existing sites. The decision could require rights-of-way to be identified and communications sites to be installed in locations or areas with greater restrictions on accessibility or construction. Restricting new rights-of-way authorizations, and modifying existing rights-of-way authorizations in riparian habitats to restore plant communities and to provide for biologic needs, also would require new systems or facilities to be installed in alternate locations to avoid habitat.

Cultural Resources: Rights-of-way authorizations could be restricted in localized areas as a result of cultural site allocations that preserve cultural resources. Also, under Alternative B, surface-disturbing activities within ½-mile of the well-preserved segments of the Butterfield Overland Trail (increased from ¼-mile under Alternative A) would not be permitted.

Paleontological Resources: Field surveys and mitigation would be required for land-disturbing activities in Class 3, 4, and 5 areas of paleontological sensitivity to ensure protection of paleontological resources. As a result, the land use authorization process could be more extensive and require the applicant to develop and comply with specific restoration, construction, or mitigation measures for approval.

Visual Resources: Rights-of-way authorizations in VRM Class I and II areas, approximately 1,237,000 acres including WSAs, ACECs, and historic trail buffers, would restrict major utilities and other rights-of-way authorizations and would likely influence project design or require project relocation. Solar energy

projects would be excluded in VRM Class I and II areas. Wind energy projects would be excluded in VRM Class I areas and avoided in Class II areas. This would be a major impact to these types of projects since nearly half the *Decision Area* would be unavailable for placement of renewable energy projects. The total avoidance and exclusion area is considerably larger than under Alternative A.

Recreation and Visitor Services: Recreation decisions relating to SRMAs would not have an impact on land tenure since no areas within SRMAs are allocated for disposal. However, the desired primitive back country recreation setting for the Organ/Franklin Mountains RMZ (part of the Las Cruces SRMA) would not be compatible with construction and maintenance required for new rights-of-way authorizations. This could result in avoiding these areas or increasing the mitigation efforts.

Lands and Realty: Under Alternative B, approximately 38,273 acres, or an 80 percent decrease from Alternative A, would be allocated for disposal. Under this alternative, specific land is not identified for acquisition, but the BLM could acquire parcels according to criteria outlined under Alternative B above. Allowing areas recommended for withdrawal that are returned to BLM administration to be managed consistent with land use plan decisions for the surrounding area, as appropriate, could increase opportunities for future land use authorizations and rights-of-way compared to Alternative A.

Land tenure could be affected by retention of land within all special designation areas and any adjacent land acquired from willing sellers. All land in WSAs and existing or newly designated ACECs would be retained. No land has been identified for disposal in any of these areas therefore; their continued designation and management as such would have no effect on land tenure.

Managing 150,000 acres of designated utility corridors in would increase the area available for transmission line rights-of-way authorizations compared to Alternative A. Land allocated for disposal within utility corridors, approximately 6,100 acres, could restrict land use authorization opportunities.

Rights-of-way authorizations would be prohibited in exclusion areas on approximately 920,000 acres. Almost all of these areas are within WSAs, ACECs, VRM Class I management areas, SRMAs and special status species habitat and represent about 33 percent of the *Decision Area*. Loss of this area for rights-of-way authorizations would have impact on their placement, causing linear projects to be rerouted and site facilities such as communication sites and renewable energy sites to be relocated or abandoned. Rights-of-way authorizations would be restricted on 109,000 acres designated as avoidance areas. These include VRM Class II areas, historic trails and one SRMA.

4.4.4.2.3 Alternative C (Preferred Alternative) Impacts on Lands and Realty

Soil and Water: Allowing surface-disturbing activities with mitigation to prevent soil movement and loss within watersheds containing 303(d) listed streams would provide more flexibility when siting new, renewed, or amended rights-of-way at existing sites compared to Alternative B.

Cultural Resources: Impacts of cultural resources decisions in Alternative C would be the same as under Alternative B.

Paleontological Resources: Impacts would be similar to those described under Alternative B.

Recreation and Visitor Services: Rights-of-way would be avoided in the Elephant Butte ERMA. Rights-of-way would only be authorized with special stipulations to mitigate any impacts to the recreational values of the ERMA.

Lands and Realty: Under Alternative C, 108,450 acres would be identified for disposal or could be transferred from BLM administration. Similar to Alternative B, specific land is not identified for acquisition, but BLM's priority for any acquisition would be inholdings or edge holdings in WSAs and ACECs. The impacts to land tenure would be the same as those under Alternative B.

Decisions concerning lands and realty would maintain existing utility corridors, establish a 1-mile-wide north-south energy corridor along Interstate 25 in Sierra and Doña Ana counties, and expand the Anthony Gap corridor up to 2 miles, increasing north-south right-of-way opportunities for major utilities as compared to Alternatives A and B. Under Alternative C, 209,000 acres of utility corridors would be designated (30 percent greater than Alternative B). However, under this alternative, approximately 20,300 would be allocated for disposal within designated utility corridors. Designating utility corridors would facilitate the placement of transmission lines (electrical lines and pipelines) and would provide upfront information to transmission line applicants on restrictions on the placement of lines. This would speed the application process and the NEPA process as well.

Reducing exclusion areas compared to Alternative B from 920,000 acres to 343,000 acres would increase the areas where rights-of-way authorizations would be considered. This would allow greater flexibility in the placement of transmission lines, communication sites, renewable energy facilities and other rights-of-way authorizations. Increasing the area managed as avoidance from 109,000 acres in Alternative B to 423,000 acres would increase the area where rights-of-way authorizations could be placed if no suitable location is available. This action would increase to a small extent the flexibility for placement of certain types of facilities. However, renewable energy facilities would generally not be authorized in avoidance areas due to the large footprint of such projects and the surface disturbance during construction.

4.4.4.2.4 Alternative D Impacts on Lands and Realty

Soil and Water: New, renewed, or amended rights-of-way at existing sites would not be restricted but surface-disturbing activities could not contribute to stream degradation. Alternative D provides more flexibility for granting ROWs than Alternative B and C.

Cultural Resources: Impacts to lands and realty are the same as under Alternative A.

Paleontological Resources: Alternative D does not require a mitigation plan for paleontological resources in the Class 3 designations. This would reduce the overall site preparation required for surface disturbing activities associated with ROWs when compared to Alternatives B and C.

Recreation and Visitor Services: Impacts would be similar to those described in Alternatives B and C. Rights-of-way in the Caballo Mountain SRMA would be authorized with special stipulations to mitigate any impacts to its recreational values.

Visual Resources: Under Alternative D, 955,000 acres, or approximately 34 percent of the *Decision Area* would be managed to meet VRM Class I and II objectives. This is more than under Alternative A, but less than Alternatives B and C. This would restrict major utilities and other rights-of-way authorizations in terms of placement and design on a major portion of the *Decision Area*; however, the extent of this restriction would be somewhat less than under Alternatives B and C.

Lands and Realty: Impacts on lands and realty from special designations would primarily result from the exclusion in these areas from land tenure adjustments. Retention land in special designations would be least under this alternative because no new ACECs would be designated and one would be deleted. This would be a minimal impact on the lands and realty program in the *Decision Area*.

Under Alternative D, approximately 186,500 acres of public land (41,557 acres in Sierra County; 39,860 acres in Otero County; and 105,106 acres Doña Ana County) would be allocated for disposal or could be transferred from BLM administration. Land that could potentially be transferred from Federal ownership would be greatest under this alternative. Impacts would be similar to those identified in Alternatives A, B, and C, but of a potentially greater magnitude because of the number of acres identified for disposal. Allowing criteria-based land tenure adjustments for land disposals on a case-by-case basis would have the same impacts as discussed in Alternative C; however, under this alternative land would not be acquired.

Decisions for lands and realty would maintain existing utility corridors and designate a 2-mile-wide corridor along Interstate 25 and the Anthony Gap. If land were disposed, BLM would no longer have the authority to sanction rights-of-way or other land use authorizations. Rights-of-way authorizations would be prohibited in land designated as an exclusion area on a total of 308,000 acres. Rights-of-way authorizations would be restricted in land designated as an avoidance area, approximately 453,000 acres. Impacts of the avoidance and exclusion areas would be similar to those described under Alternative C since the total avoidance and exclusion areas are approximately the same acreage and locations.

4.4.5 IMPACTS ON RENEWABLE ENERGY

In 2006, the BLM released a programmatic EIS for the development of wind energy on BLM land. The analysis of wind energy in the *TriCounty Decision Area* tiers to that EIS. Likewise, the BLM and the Department of Energy prepared a programmatic EIS for solar energy development on BLM land and the analysis of solar energy development in the *TriCounty Decision Area* tiers to that EIS, published in 2012. The following assumptions were used when assessing the impacts on renewable energy development:

- The primary consideration in locating solar or wind energy projects would be the availability of the solar or wind resource to produce commercial quantities of electrical power.
- Solar enterprise zones as identified in the *Solar Energy Development in Six Southwestern States Final Programmatic EIS, Volume 6, New Mexico Proposed Solar Energy Zones* (2012) would be the priority areas for siting utility scale solar energy projects.
- Applications for proposed wind energy projects would be processed as rights-of-way under Title V of FLPMA and Title 43, Part 2800 of the Code of Federal Regulations (CFR).

4.4.5.1 Impacts on Renewable Energy Common to All Alternatives

The placement of renewable energy projects would be restricted by the existence of avoidance and exclusion areas, WSAs, ACECs, VRM management classes and other management designations and prescriptions (see Table 4-2). The amount of area closed or restricted varies across the alternatives.

The development of existing oil and gas leases or new geothermal leases would not be expected to have any impact on renewable energy projects, due to the small number of existing leases, the localized nature of leases and the lack of overlap between areas of moderate potential for oil and gas and high potential for geothermal resources and similar appellations for wind and solar energy.

4.4.5.2 Impacts of the Alternatives on Renewable Energy

4.4.5.2.1 Alternative A Impacts on Renewable Energy

Special Designations: Under Alternative A, 370,000 acres in WSAs, ACECs and a ¼-mile buffer around El Camino Real National Historic Trail would be excluded from the placement of either solar or wind energy projects.

Lands and Realty: Impacts to renewable energy would be the same as the rights-of-way analysis above in Section 4.4.4.2.1

4.4.5.2.2 Alternative B Impacts on Renewable Energy

Special Designations: Fewer lands would be available for wind energy than under Alternative A as a result of the greater number of proposed ACECs and an increase in the width of the exclusion area associated with Historic Trails.

Lands with Wilderness Characteristics: Managing the Nutt Grasslands to protect wilderness characteristics would likely preclude any future development of wind energy projects in this area. A commercial wind energy project on 1,900 acres of private land in Luna County is less than 10 miles west of the Nutt Grasslands area. The management of the area to prevent impact to wilderness characteristics would prevent any future projects being sited on about 11,000 acres in the Nutt Grasslands.

Lands and Realty: Wind energy projects would be excluded from a number of designated exclusion and avoidance areas as shown in Table 2-12 and Map 2-19. Mitigation measures developed as part of the NEPA process would be necessary for development in avoidance areas. The impact of these restrictions would be to reduce the area where wind energy projects could be placed and could remove areas with highest wind resource from consideration for siting a wind energy project.

Renewable Energy: Under this alternative, a systematic and managed renewable energy development program would be established in the *Decision Area*, whereas it would likely not occur under Alternative A. Utility scale solar energy projects would be allowed only in the Afton SEZ. There would be no impacts to solar energy development from other resources within the SEZ.

4.4.5.2.3 Alternative C Impacts on Renewable Energy

Special Designations: Both wind and solar energy projects would be excluded from lands with special designations. The land available for renewable energy would be greater than under Alternative B.

Lands with Wilderness Characteristics: Under this alternative, the Nutt Grasslands would be managed as an exclusion area for wind energy projects. The impacts on wind energy would be the same as those described under Alternative B.

Lands and Realty: Impacts would be the same as those described for Alternative B but more land would be considered avoidance areas than exclusion areas.

Renewable Energy: Afton SEZ would remain the priority for siting solar projects but sites outside the SEZ would be considered as well, thereby increasing the potential for solar development.

4.4.5.2.4 Alternative D Impacts to Renewable Energy

Special Designations: Only special designations, WSAs, ACECs, El Camino Real Historic Trail and VRM Class I areas, would be excluded from wind energy development. This would be more area than under Alternatives B and C but less than that available under Alternative A. An additional 100,000 acres over Alternative C would be available for wind development.

Lands with Wilderness Characteristics: Under this alternative, the Nutt Grasslands would be managed as an avoidance area for wind energy projects. Projects would only be permitted that were stipulated to avoid impacts to the wilderness characteristics.

Lands and Realty: Alternative D impacts would be similar to the impacts described under Alternative C.

Renewable Energy: Impacts would be the same as those described under Alternative C.

4.4.6 IMPACTS ON MINERALS: FLUID, MINERAL MATERIALS, AND LOCATABLE MINERALS

The analysis of effects on minerals is limited to effects on opportunities for mineral production and development. Impacts on fluid-minerals, locatable minerals, and mineral materials generally would occur as a result of (1) use of mineral resources in a manner that does not offer the highest value for the use of public land to the people of the United States, such as permitting the sale of crushed rock from an unusual type of granite outcrop that may bring higher value as quarried building stone, and (2) recommending areas for withdrawal or closing areas to mineral exploration and development. The following assumptions were used when assessing the impacts on mineral resources:

- As population growth increases, so would the demand for leasable and renewable energy resources, as well as locatable and saleable mineral resources.
- All existing mineral authorizations would be managed under the stipulations in effect when authorized, and new stipulations proposed under this RMP would apply if the actions were amended, subject to valid existing rights.
- Mineral development would occur throughout the entire *Decision Area*, except where restricted by management actions.
- Increased mitigation would generally increase short-term financial cost and risk. Increased restrictions and withdrawals would decrease resource availability.
- Decisions that restrict rights-of-way authorizations on land open to, or bordering areas open to, mineral leasing or development could restrict the construction of required systems or facilities, such as access roads, power lines, or pipelines through those areas, and therefore restrict the ability to extract or use the mineral resources.
- Unless a withdrawal exists, mining claimants have an inherent right to mine, which cannot be revoked by the BLM.
- Areas recommended for withdrawal from mineral entry would require approval by either Congress or the Secretary of the Interior depending on the size of the proposed withdrawal.
- All military withdrawals (White Sands Missile Range, Ft. Bliss, McGregor Range, and Holloman Air Force Base), White Sands National Monument, and San Andres National Wildlife Refuge are withdrawn from mineral entry and are not further analyzed here.
- No new oil and gas leasing would occur under the action alternatives pending the completion of the programmatic EIS addressing oil and gas leasing as described in Chapter 2.
- Impacts of deferral of leasing would be short-term pending completion of the programmatic EIS.
- Impacts from the development of valid existing rights associated with existing leases would be recognized, based on best available information.

Under all alternatives, impacts on minerals would not be anticipated as a result of management actions for the following resources and resource uses: vegetation, forest woodland and plant products, wildland fire management, livestock grazing, and comprehensive trails and travel management.

Restriction, prohibition, or recommendation of areas for withdrawal of mineral resources would be induced primarily by decisions under mineral resources, lands and realty, special designations, and visual resources. In addition, decisions regarding cultural resources and outdoor recreation also would affect the BLM's ability to authorize leases or mineral material sales, but to a lesser extent (i.e., effects would be localized or mitigated).

4.4.6.1 Impacts on Minerals Common to All Alternatives

The greatest impact on the potential for fluid-mineral development would result from nondiscretionary and discretionary closures to fluid-mineral leasing, which would occur under all alternatives (see Table 4-2). In the *Planning Area* for purposes of the analysis of impacts, nondiscretionary closures would include all WSAs and former military bombing ranges on Otero Mesa, and National Oceanic Atmospheric Agency weather sites in Sierra County (a total of 333,206 acres).

Discretionary closures would include all existing ACECs that are currently closed to leasing and would be carried through all alternatives. Consequently, approximately 75,020 acres would be closed to leasing and would be foregone to fluid mineral leasing, exploration and development. This constitutes 2.6 percent of the mineral estate in the *Decision Area* and is primarily in areas of low fluid mineral potential.

Geothermal leasing and development would be foregone in areas of high potential in the Organ/Franklin Mountains ACEC and at the north end of the Robledos WSA. Existing leases in these areas could be developed and utilized.

There are no high potential areas for oil and gas in the *Decision Area*. However, 80,000 acres that would be closed to leasing, mostly in WSAs and ACECs, is within moderate potential areas for either oil and gas or geothermal resources. Very few leases exist in these areas and exploration may occur, but development is not likely.

Overall, the surface management constraints as well as required mitigation procedures and BMPs (Appendix D) imposed by the alternatives are not anticipated to drastically impact the ability to explore or develop mineral resources. Surface management requirements may potentially burden the project economics so that the project activities may be delayed (e.g., compliance with VRM). Some surface management requirements are more costly, such as avoidance and exclusion criteria that may necessitate the use of directional drilling. The additional cost of the management requirements versus the anticipated revenue of the project may make the project economically unfeasible.

Withdrawals for locatable mineral entry (i.e., areas where locatable minerals cannot be extracted) in ACECs, SRMAs, and WSAs could possibly preclude locatable mineral development (grandfathered mining claims may still be developed), subject to valid existing rights, and may contribute to local mineral shortages and price increases of metals, industrial minerals, and uncommon varieties of building stone. Withdrawal would not take place as a result of the Record of Decision, but only as a result of a subsequent withdrawal process involving the Secretary of the Interior's office or the US Congress, depending on the size of the proposed withdrawal. Mineral materials development either as sales or free-use would not occur in WSAs (*Management of Wilderness Study Areas Manual 6330*).

Impacts on minerals associated with visual resource decisions for WSAs would be the same under all alternatives. In areas managed as VRM Class I or II, mineral development would be more restricted in order to comply with management guidelines associated with these classes. Exploration would be allowed if it did not cause undue or unnecessary degradation. No claims can be staked or extraction can occur on areas withdrawn from mineral entry; however, areas (claims) with valid existing rights could still be developed.

4.4.6.2 Impacts of the Alternatives on Minerals

4.4.6.2.1 Alternative A Impacts on Minerals

Fluid Minerals: Approximately 60,000 acres (4 percent of the mineral estate) in Sierra and Otero counties and 334,000 acres (24 percent of the mineral estate) in Doña Ana County would be closed to fluid-mineral (e.g. oil, gas, and geothermal) leasing, which would preclude exploration and development and render energy resources unreachable in those areas. Just 19,000 acres, or 0.44 percent of the *Decision Area*, are discretionarily closed to leasing within areas with a moderate potential for fluid minerals.

Continuing to apply the No Surface Occupancy (NSO) fluid-mineral leasing stipulation to oil and gas leasing that prohibits occupancy or disturbance on all or part of the lease surface in order to protect special values or uses in 18,000 acres (approximately 1 percent of the mineral estate) in Sierra and Otero counties and 2,200 acres (less than 1 percent of the mineral estate) in Doña Ana County could necessitate directional drilling or other extraction methods to develop resources. A stipulation of NSO could result in the relocation of systems or facilities, increased extraction costs, and the possible loss of energy resources that cannot be extracted by current or future drilling technology. Some of the areas with the leasing stipulation of NSO would occur in areas with moderate potential for fluid-minerals; however, many of these areas are small, and the resource availability is not anticipated to be greatly affected.

Applying Controlled Surface Use (CSU) stipulations (i.e., allowing use and occupancy but requiring special operational constraints that may modify the lease rights to protect identified resource values) for oil and gas leasing on 793,000 acres (40 percent of the mineral estate) in Sierra and Otero counties and 106,000 acres (10 percent of the mineral estate) in Doña Ana County could influence the placement of systems or facilities and, as a result, increase the cost of developing the resources. When operating costs increase, some price increases could be passed to the user. A majority of the areas with CSU are located in areas of moderate potential for fluid-minerals.

Locatable Minerals:

Special Designations: Currently 11,000 acres are segregated or withdrawn from mineral entry in the *Decision Area*. (This does not include military withdrawals.) The Mimbres RMP decision would withdraw an additional 65,635 acres in special designations from mineral entry. Except for valid existing rights, the location, exploration and development of mining claims would be foregone in these areas. All withdrawals must be approved by the Secretary of the Interior if less than 5,000 acres, or Congress, if 5,000 acres or more.

Any activity over and above casual use within an ACEC would require that the claimant submit a mine plan of operation (MPO) per 43 CFR 3809 regulations. While BLM cannot deny the MPO, mitigation and stipulations can be applied to the authorization to prevent unnecessary and undue degradation to the resources.

Mineral exploration and development in a WSA would be determined by the "*grandfathered use*" clause of the BLM Manual 6330 *Management of Wilderness Study Areas* (USDOI BLM 2012b) and the undue and unnecessary degradation prohibition of FLPMA. However, there has been little interest in mining activity in WSAs in the recent past and none is expected in the foreseeable future.

Mineral Materials:

Special Designations: Closing 355,623 acres to mineral material disposal, primarily in WSA and ACECs, would preclude possible development of sand, gravel, and building stone sources, and contribute to local mineral shortages and price increases particularly in Doña Ana County where the construction industry is most active. Closures could result in longer hauling distance for materials purchased by contractors. Municipal and County agencies would also be prohibited from obtaining free-use permits for public projects within or near the closed areas, which could increase the costs of local infrastructure projects. Areas proposed for closure represent less than 10 percent of the Federal mineral estate in the *Decision Area*. However, most of these areas consist of bedrock outcrops, which would restrict the availability of specific mineral materials such as crushed stone, railroad ballast, and decorative stone.

Visual Resources: *I*mpacts on minerals from management actions associated with visual resources decisions that designate approximately 10,000 acres in Sierra and Otero counties and 33,000 acres in Doña Ana County as VRM Class I areas would preclude energy and mineral development and would increase the cost of mineral resource extraction and development. However, all of the land designated as VRM Class I coincides with nondiscretionary and discretionary closures, which would preclude mineral development regardless of the VRM designation.

Lands and Realty: Under lands and realty decisions, right-of-way exclusion areas (51,500 acres in Sierra and Otero counties and 385,000 acres in Doña Ana County) and avoidance areas (4,200 acres in Otero counties and 9,000 acres in Doña Ana County) could limit future access to mineral exploration and development sites and could restrict the placement of systems or facilities associated with mineral exploration and development. Associated systems or facilities would include pipelines, transmission lines, communication systems or facilities, and roads. In addition, approximately 207,000 acres of land designated for disposal under Alternative A are located in areas with moderate potential for oil and gas resources and in areas with a high or known potential for geothermal resources. The value of mineral resources, in lands designated for disposal, would need to be identified prior to disposal would ensure people of the United States receive the highest value for the transfer of public land.

4.4.6.2.2 Alternatives B, C, D Impacts on Minerals

Fluid Minerals:

During the last several years, the area of greatest interest for oil and gas leasing and exploration has been Otero Mesa in southern Otero County. However, other areas in Doña Ana County have been leased during that time. Under Alternatives B, C, and D, oil and gas leasing would be deferred throughout the *Planning Area* until a programmatic EIS addressing oil and gas leasing and management is prepared following completion of the *TriCounty* RMP.

As a result of the deferral, there would be no future oil and gas leasing; consequently there would be no exploratory drilling or production of oil and gas except on existing leases. Any existing leases as of the time of issuance of the Records of Decisions of the *TriCounty* RMP would continue until those leases expire and would not be renewed.

The deferral of leasing would result in foregoing future exploration and development of oil and gas resources in areas that are not currently leased, but would likely be a temporary impact until the programmatic EIS for oil and gas leasing and development is completed. Any drilling or production of state or privately-owned oil and gas estate could result in the draining of Federally-owned oil and gas on adjacent Federal mineral estate that is deferred from leasing. This could result in the loss of revenue and resources from Federally-owned minerals.

Geothermal leasing exploration, drilling, development and utilization would continue except on discretionarily and non-discretionarily closed mineral estate. This would amount to 258,180 acres closed non-discretionarily under Alternatives B, C and D. Discretionary closures in A and D would be 75,020 acres. Discretionary closure in Alternative B would be 570,000 acres; 431,000 acres in Alternative C. An estimated 4,500 acres of high potential geothermal resource in existing ACECs would continue to be closed. Geothermal leasing and development would be foregone in these areas.

The loss of opportunity for development would be a substantial impact locally, but the remainder of the *Decision Area* including areas with high potential for geothermal resource development would remain open to leasing subject to stipulations listed in Appendix K. In the past, geothermal development has primarily been for direct use applications such as greenhouse heating. This type of development and use of leases would likely continue in the future. It is estimated that over 90 percent of the area with high or moderate potential for geothermal resource development would remain open for leasing subject to the stipulations in Appendix K.

4.4.6.2.3 Alternative B Impacts on Minerals

Special Designations: Management of locatable mineral development would be the same as under Alternative A, except an increase in ACECs increases the area recommended for withdrawal from locatable entry. This would be an impact to the availability of mineral resources. No new claims can be staked on areas withdrawn from mineral entry which could contribute to local mineral shortages and price increases. Prior to a withdrawal, a mine plan of operation would be required in the larger number and area of ACECs under this alternative for any mineral activity beyond casual use.

Approximately 705,000 acres would be closed to mineral material disposal which would preclude mineral development. In addition, decisions concerning cultural resources, recreation, paleontology, and fish and wildlife also could restrict development of mineral resources, but to a lesser extent (i.e., if effects from mining could be localized or mitigated). This would decrease the area where mineral exploration and development could occur compared to Alternative A.

Fish and Wildlife Habitat: Decisions applicable to fish and wildlife that restrict new rights-of-way authorizations in riparian areas (and their associated watersheds) would further limit access to mineral exploration and development of sites. However, this would be a negligible impact because the amount of riparian zones within the *Decision Area* is no more than a few hundred acres.

Cultural Resources and Paleontological Resources: Decisions under cultural resources to increase the distance where surface-disturbing activities are prohibited to greater than ½-mile from the Butterfield Overland and Mormon Battalion trails would minimally hinder or limit access for some mineral exploration and extraction of mineral resources in those areas. However, this restriction would not apply to locatable minerals which would be governed by the regulations at 43 CFR 3809.

Both cultural and paleontological resource surveys would be done prior to any ground disturbance associated with locatable or mineral material exploration, development or extraction. These requirements would apply to both a notice and a mine plan of operation. Results of the surveys could require

mitigation such as relocating the drill site or excavation, rerouting access, or avoiding areas where these resources are located. These actions could delay mineral exploration and development activities, including geophysical exploration, thereby increasing costs to the operator. BLM cannot deny a proposed action unless it would be determined to cause undue or unnecessary degradation.

Visual Resources: Impacts on minerals from management actions associated with managing 27,000 acres as VRM Class I areas in Sierra and Otero counties and 47,000 acres in Doña Ana County would preclude energy and mineral development, and there would be no mineral resource extraction and development cost in comparison with Alternative A. Management prescriptions in VRM Class II areas would include stipulations and mitigation measures for most mineral actions. In addition, for all three counties, areas of high sensitivity would be a priority for reducing visual contrast, which could reduce opportunities for mineral material sites and mines or require additional mitigation measures for proposed projects.

Recreation and Visitor Services: Outdoor recreation decisions for Alternative B would cause a decrease of 53,000 acres in opportunities for development of mineral materials (e.g. sand, gravel, fill material, or clay), or locatable minerals when compared with Alternative A.

Lands and Realty: Under lands and realty, right-of-way exclusion areas (920,000 acres) and avoidance areas (109,000 acres) could limit future access to mineral exploration and development sites to a lesser extent than under Alternative A. In addition, under Alternative B, the amount of land designated for disposal in areas with moderate potential for oil and gas resources and high or known potential for geothermal resources would decrease as compared to Alternative A.

Minerals: Under Alternative B, the Federal fluid mineral estate underlying the NMSU Rangeland Research Center would be closed to geothermal leasing. The United States retains the entire mineral estate under the NMSU Rangeland Research Center, subject to the covenant that BLM will not lease or sell mineral resources without the consent of NMSU. However, this closure would preclude the necessity of obtaining such consent and would serve as a "*first screen*" for potential location of geothermal exploration wells by industry on approximately 60,000 acres. A portion the southwest part of the Rangeland Research Center is adjacent to the Radium Springs where geothermal resources are being used for greenhouse heating. Geothermal resources are also known to exist at Tonuco Mountain along the northwest boundary of the NMSU Rangeland Research Center; therefore, it is likely that similar resources exist on the adjacent portions of the rangeland research center. Development of this resource would be foregone. The extent of this impact cannot readily be quantified due to the lack exploratory activity in the area; however, Witcher (1995) estimated that deep water temperatures at nearby Radium Springs could range as high as 100 - 150°C which is potentially suitable for either direct (heating space or water) and indirect (electrical energy production) uses (USDOI BLM 2008c).

4.4.6.2.4 Alternative C (Preferred Alternative) Impacts on Minerals

Special Designations: Impacts would be essentially the same as Alternative B. Recommending areas for withdrawal from locatable mineral entry would have the same impacts as under Alternative B, except that Alternative C would have fewer acres of ACECs; therefore fewer acres would be recommended for withdrawal from mineral entry.

Fish and Wildlife Habitat: Impacts under Alternative C would be the same as under Alternative B.

Cultural Resources and Paleontological Resources: Decisions under cultural resources would minimally hinder or limit access for some mineral exploration and extraction of mineral resources in the

vicinity of historic trails. However, this would not apply to locatable minerals which would be governed by the regulations at 43 CFR 3809.

Both cultural and paleontological resource impacts to minerals in Alternative C would be similar to those described in Alternative B.

Visual Resources: Impacts on mineral material sales from management actions associated with visual resources decisions that designate approximately 10,000 acres as VRM Class I areas in Sierra and Otero counties would preclude energy and mineral development over less area than under Alternative B and the same amount of area as under Alternative A. Impacts on minerals from management actions associated with visual resources decisions designating 36,000 acres as VRM Class I areas in Doña Ana County could preclude discretionary mineral actions, and could increase mitigation needs for the development of mining claims. Management prescriptions for VRM Class II areas also increase stipulations and mitigation measures for the development of minerals. Increasing areas managed to meet VRM Class I and II objectives could increase the cost of mineral development compared to Alternative A.

Recreation and Visitor Services: Outdoor recreation decisions for Alternative C would cause a decrease in opportunities for development of mineral materials (e.g. sand, gravel, fill material, or clay), or locatable minerals when compared with Alternative B.

A greater number of SRMAs would be designated under Alternative C compared to Alternative A and B. These areas would be closed to mineral material disposal and geothermal leasing. This decision could restrict mineral development to a greater extent than Alternative A or B.

Lands and Realty: In lands and realty, right-of-way exclusion areas (343,000 acres) and right-of-way avoidance areas (423,000 acres) could limit future access to mineral exploration and development sites and would restrict the placement of systems or facilities associated with mineral exploration and development in a smaller area than Alternative B.

Under Alternative C, the amount of land identified for disposal in areas with moderate potential for oil and gas resources and high or known potential for geothermal resources would be slightly increased as compared to Alternative B, although much of the additional land designated for disposal would be located in low-potential areas for oil and gas. On any disposed parcels, subsurface mineral rights would be retained by the Federal Government. Consequently, operators proposing development of the retained Federal mineral estate would either have to negotiate an access agreement with the surface owner, or submit an operating plan and surface reclamation bond for BLM approval. This could increase start-up time and operating costs for the mineral producer. When public land is sold or exchanged under 43 U.S.C. 682(b) (Small Tracts Act), 43 U.S.C. 869 (Recreation and Public Purposes Act), 43 U.S.C. 1713 (sales) or 43 U.S.C. 1716 (exchanges), minerals reserved to the United States continue to be removed from the operation of the mining laws unless a subsequent land-use planning decision expressly restores the land to mineral entry, and the BLM publishes a notice to inform the public (43 CFR 3809.2).

Minerals: Impacts from fluid minerals management and leasing deferment would be the same as those described under Alternative B, including the impacts of closing the geothermal estate underlying the NMSU Rangeland Research Center.

Approximately 457,000 acres would be closed to mineral material sales. This would preclude possible saleable mineral development in a larger area than under Alternative A but much smaller area than under Alternative B. Although there is a sizable difference between the two alternatives, the impacts would be similar since most of the open area under Alternative C as compared to Alternative B, are a considerable distance from where the material would be used.

4.4.6.2.5 Alternative D Impacts on Minerals

Special Designations: Alternative D impacts would be the same as described under Alternative A.

Fish and Wildlife Habitat: Minerals would not be impacted under Alternative D.

Cultural Resources and Paleontological Resources: Under Alternative D the distance where surface-disturbing activities are prohibited from the Butterfield Overland and Mormon Battalion trails would be ¼ mile, less than Alternative B. Other impacts to minerals in Alternative C would be similar to those described in Alternative B.

Visual Resources: Impacts on minerals from managing 4,300 acres to meet VRM Class I objectives in Sierra and Otero counties would preclude energy and mineral development over less area than Alternatives A, B, and C. Impacts on minerals from management actions associated with visual resources decisions designating 35,000 acres as VRM Class I areas in Doña Ana County would preclude energy and mineral development over more area than Alternatives A and C, but less area than Alternative B. Management prescriptions for VRM Class II areas could add stipulations and mitigation measures increasing the cost of mineral exploration and development.

Recreation and Visitor Services: Impacts would be the same as Alternative C, except that the areas recommended for withdrawal would be less than for Alternative B or C. Recreation decisions for Alternative D would increase opportunities for leasing and development of fluid-minerals, mineral materials, or locatable minerals as compared to all other Alternatives. The Three Rivers SRMA would be the only SRMA that would be discretionarily closed to fluid-mineral leasing.

Lands and Realty: Under lands and realty, right-of-way exclusion areas (308,000) and right-of-way avoidance areas (453,000 acres) could limit future access to mineral exploration and development sites and could restrict the placement of systems or facilities associated with mineral exploration and development. In addition, under Alternative D, the amount of land designated for disposal is approximately 1.7 times greater than under Alternative C. Therefore, the amount of land designated for disposal that is located in areas with moderate potential for oil and gas resources and high or known potential for geothermal resources would increase as compared to Alternative C.

Fish and wildlife management decisions that restrict new rights-of-way authorizations in riparian areas and their associated watersheds would not limit access to mineral exploration and development of sites.

Minerals: Impacts from fluid minerals management and leasing deferment would be the same as those described under Alternative B.

Under the existing title covenant for the Rangeland Center, the BLM will not lease or sell mineral resources without the consent of NMSU. However, assuming that leasing would occur activities would impact surface use. Leaving the fluid mineral estate underlying the NMSU Rangeland Research Center open to geothermal leasing would allow the area to be leased for exploration and possible development. This would likely result in new roads being developed to allow access for drilling equipment, clearing areas for drill pads, increasing traffic in the area, and adding to the human presence and disturbance. All of these activities would be incompatible with the mission and management of the research center and would have an overall negative effect on the surface use of the center.

Approximately 353,000 acres would be closed to mineral material disposal which would preclude commercial development of mineral resources and issuance of free use permits to other agencies. This would leave approximately the same area available for mineral development as Alternative A and

increases the area where mineral development could occur compared to Alternatives B and C. The impact would be negligible since this would only slightly increase the availability of construction material in the *Decision Area*.

4.4.7 IMPACTS ON SOCIOECONOMIC CONDITIONS

Economic impacts are defined as expected gains or losses from market transactions on local jobs and income and market and nonmarket value of resources to users. Direct economic impacts include jobs, wages, and expenditures related to an activity (e.g., mineral resource development). Indirect economic impacts are realized through the interrelated purchase of goods or services for the economic activity (e.g., equipment and service providers) and result from the circulation of dollars through the local economy in a "ripple" or multiplier effect.

Social impacts are defined as the consequences to human populations that alter the way in which people live, work, recreate, relate to one another, and generally cope as members of society. Social impacts can be either direct, meaning that they would potentially result from the action taken, or secondary, meaning that the result is separated from the direct impact by time or geographic distance.

Key economic impact variables that were considered as part of the analysis include employment, income, economic dependency, and market and nonmarket economic value of resources to users within the social and economic study area and at the regional and National levels. Key social impact variables include population change, community and institutional structures, political and social resources, community and family changes, and community resources.

The programs with the strongest correlation between BLM management and social and economic conditions are energy and minerals; livestock grazing; recreation; and lands and realty. This analysis of the potential social and economic impacts of the alternatives considers the current contribution of the BLM's resource management on the social and economic environment of the region. It is assumed that the current trends for economic and social needs, demand, and values are indicative of those that will continue for the next 20 years.

4.4.7.1 Impacts on Socioeconomic Conditions Common to All Alternatives

Economic impacts are defined as expected gains or losses from market transactions on local jobs and income and market and nonmarket value of resources to users. Direct economic impacts include jobs, wages, and expenditures related to an activity (e.g., mineral resource development). Indirect economic impacts are realized through the interrelated purchase of goods or services for the economic activity (e.g., equipment and service providers) and result from the circulation of dollars through the local economy in a "ripple" or multiplier effect. Induced economic impacts are the effects of individuals spending their earnings in the local economy (e.g., a clerk at a local hotel purchasing groceries or getting a haircut).

Under all alternatives, economic opportunities are largely dependent on management decisions for energy and mineral resources; livestock grazing; recreation; lands and realty; and renewable energy. Because the alternatives are developed to address issues and concerns regarding resource management, they inherently recognize the social values of the protection of air quality, soil resources, water and watershed resources, vegetation, fish and wildlife, special status species, cultural resources, trails, paleontology, visual resources, wildland fire management, wilderness characteristics, and special designations.

Public land would continue to be available for development of geothermal resources, locatable minerals, and mineral materials. Exploration for and extraction of mineral resources has direct socioeconomic

impacts associated with resource development (e.g., jobs, wages, expenditures, and tax and royalty payments to the State of New Mexico and U.S. General Fund) as well as indirect socioeconomic impact in interrelated industries (e.g., indirect jobs, wages, and personal and government expenditures) and to consumers. However, under the action alternatives, oil and gas leasing would be deferred until a programmatic EIS is developed to address leasing and development. The magnitude of the potential impacts is unknown due to the lack of information about the oil and gas resource. Existing commercial use of geothermal energy and mineral material would continue to provide economic benefits, particularly in Doña Ana County where most of the use of both of these resources occurs.

The value of energy and mineral resources in land identified for disposal would be evaluated during the disposal analysis process to ensure the highest value for the use of public land to the people of the United States. In most cases, the mineral estate is retained by the Federal government when the surface is disposed to another entity.

Livestock grazing would continue on public land in the *Decision Area*. There would continue to be a direct economic value in the form of income to ranching activities. Grazing fees would continue to supplement range improvement expenditures. Indirect socioeconomic impacts would continue in the form of employment in expenditures in the agricultural services and other related sectors. Grazing would continue to be managed to meet the *New Mexico Standards and Guidelines,* thus allowing for adjustments in use levels, season of use, kind of livestock, and stocking rates, which would result in fluctuations in economic gains associated with grazing commensurate with rangeland conditions.

Recreation uses of public land would continue to provide for collection of recreation fees at selected sites such as Three Rivers Petroglyph Site and Aguirre Spring Campground, and in association with special recreation permits. Recreation opportunities provided on public land support retail, food and accommodation, and other service industries in local economies by attracting visitation from outside the local area. This, in turn, results in economic impacts via jobs and income in these industries, indirect income as wages circulate through the local economy, and tax revenue for local jurisdictions. Statewide outdoor recreation generates 47,000 jobs and accrues $3.8 billion annually to New Mexico's economy and $184 million in annual New Mexico state tax revenue (NM SCORP 2010-2014). Expenditures from those recreating on public land in the *Decision Area* provide an unknown but incremental input to the statewide totals. In the *Planning Area*, public land provides most of the outdoor recreation experience for locals and visitors alike.

Lands and realty management decisions would continue to allow for land tenure adjustments to accomplish resource management goals and to meet various needs, including public interest and community needs. Any major project would involve evaluation by local governments and possible Federal government review, both of which would provide opportunity for public input, and potentially environmental review. Land tenure adjustments could result in minor changes to payments in lieu of taxes. Also, commercial use of public land (with proper authorizations, permits, and adherence to natural and cultural resource protection requirements) would continue to result in economic gains in the income and employment for commercial businesses and indirect impacts in related economic sectors.

Under the action alternatives, solar energy projects would primarily be confined to the Afton SEZ; most of the social and economic impacts within the *Decision Area* would accrue to Doña Ana County.`

In 2011, a 50 MW wind farm consisting of 28 turbines was constructed on private land in Luna County about 2 miles from the Sierra County boundary. Project construction involved approximately 150 workers and operation is expected to provide over $8 million in revenue to Luna County through the County's taxing authority over the 20-year life of the project (North American Wind Power, *Element Power Begins Construction on Macho Springs Wind Farm,* February 2011). Other wind energy projects

would likely be developed within the *TriCountyDecision Area* during the life of the RMP. Economic impacts of those projects would be commensurate with the Macho Springs project, depending on the size and location of the projects.

4.4.7.2 Impacts of the Alternatives on Socioeconomic Conditions

4.4.7.2.1 Alternative A Impacts on Socioeconomic Conditions

Under Alternative A, the BLM management of public land in the *Planning Area* would continue under current management direction.

Special Designations: Managing and maintaining the open spaces associated with WSAs, lands with wilderness characteristics, ACECs, and historic trails (approximately one-tenth of the *Decision Area*) would strengthen the sense of place for many local people and visitors.

Vegetation and Woodlands: Free use permits for collection of plants used in ceremonial/religious events and vegetation sale areas would continue. The value of free use permits would continue to be a primary social value for those who collect and use forest, woodland, and plant for personal or ceremonial/religious purposes or sustenance.

Livestock Grazing: Livestock grazing would continue to be affected by existing resource management decisions, and the *New Mexico Standards and Guidelines for Public Land Health*. Conflicts with recreationists, off-road vehicle use, land disposal, and renewable energy development could result in a reduction of forage quantity, and could have a slight to moderate economic impact on the livestock economy.

Recreation and Visitor Services: The continuation of existing recreation management programs would result in relatively minor local economic impacts due to visitor expenditures and highly varied social impacts associated with the availability and quality of recreation activities. Many of the issues and concerns raised during public scoping and ongoing public involvement for the *TriCounty* Draft RMP/EIS were centered on recreation uses. Associated social effects, such as conflicts among uses and users, would continue and could potentially escalate under Alternative A.

Lands and Realty: The implementation of right-of-way exclusion and avoidance areas would limit the options for the places where right-of-way projects would be considered. A proponent of a right-of-way or other land use action could be prohibited from completing a proposed project due to incompatibilities with land management decisions or could have to select a less desirable or more expensive location, routing, or design/build process. Right-of-way avoidance and exclusion areas would protect areas with high resource value such as scenery, rare species, recreation areas, historic and prehistoric sites, and wildlife habitat with social and economic benefits as described in the Impacts Common to All Alternatives Section.

Continuing existing realty management decisions would impact potential realty transactions and land development. Approximately 213,000 acres would be allocated for disposal or transfer from BLM administration. This allocation provides potential opportunities for development actions by major utilities and other rights-of-way authorizations. Land identified for disposal could become available for state or local governments or others for a variety of uses. Existing utility corridors located in Doña Ana County would remain and would allow for additional use and new right-of-way development. Development within existing or new rights-of-way would have potential social impacts related to the location of the

development and economic impacts on the service population affected by infrastructure improvements. These impacts would be evaluated on a site-specific basis in accordance with NEPA.

During public scoping for the RMP, many people expressed their interest in maintaining open spaces as much as possible, particularly in the Las Cruces urban interface, as a lifestyle amenity. Land tenure adjustments could also have a negative effect on lifestyle, if open space would be lost in the disposed areas. Some areas, such as those disposed under the Recreation and Public Purposes Act would likely be developed as parks or public use areas which would change the use on the original parcel, but would reduce or eliminate impacts that would occur if the areas were intensely developed.

Renewable Energy: Under Alternative A, renewable energy projects could be located throughout the *Decision Area* wherever conditions are suitable and outside of right-of-way avoidance and exclusion areas. As described above for the Macho Springs Project in Luna County, these projects would be a major economic benefit to the counties in which they are located. Employment and wages would increase during construction and tax revenues would accrue to the counties during the life of project operation.

Minerals: Potential economic gains and social change from development of energy or mineral resources would continue to be limited by restrictions on valid existing rights. Areas closed to fluid-mineral leasing, although in medium-potential areas, would preclude fluid minerals development and thus any economic gain for the life of the RMP. Development could still occur in other areas but due to the low to moderate potential for oil and gas there would likely be little economic gain. Although geothermal leasing and development would continue and the potential for economic production is high along the Rio Grande Valley, past projects have been relatively small scale. These projects have been primarily for direct use applications such as greenhouse heating.

Energy and mineral resource development within the *Decision Area* would be expected to continue to be a minor component of the local economy. Closing WSAs and ACECs to fluid mineral leasing would preclude exploration and development on a total of 352,000 acres and would protect the naturalness and special values, both cultural and natural, of these areas. Although this is only about 12.5 percent of the *Decision Area*, protected areas have a major, positive impact on economic growth in rural counties. Per capita income in isolated rural counties with protected land grew up to 60 percent faster than similar counties without protected lands (Rasker, R. et al. 2004).

4.4.7.2.2 Alternative B Impacts on Socioeconomic Conditions

Under Alternative B, resource and resource use decisions would be more restrictive for energy and mineral resource development, livestock grazing, recreation, lands and realty, and forest, woodland, and plant products, thus impacting existing socioeconomic conditions in the *Planning Area*.

Special Designations: Under Alternative B, development would be restricted in portions of the *Decision Area*, which would be a positive impact for outdoor recreation and those who have an appreciation for the natural wonders of the public land. Facilities development would be minimized with more of the area maintained in the current natural condition.

Vegetation and Woodlands: The management decisions for forest, woodland, and plant products would be more restrictive under Alternative B than the other alternatives. No plant sale areas would be identified and area permits for vegetation sale would not be authorized. Unlike Alternative A, harvest of vegetation products would be specifically tied to improvement of the ecological health of forest and woodlands. Such management decisions could translate into minor, localized losses to those with commercial interests in the vegetation resources on public land.

Livestock Grazing: Under Alternative B, livestock grazing could be discontinued after voluntary relinquishment of all or part of a grazing preference. This could result in some foregone opportunities, compared to Alternative A, for other ranchers and a small decrease in jobs and income due to discontinuation of grazing on the specific relinquished preference. However, land could continue to be suitable for grazing. A 25 percent reduction on vegetation with limited restoration potential would only slightly impact ranchers since AUMs on these types of rangeland may be in suspension and not in current use.

Recreation and Visitor Services: Given restrictive management and greater acreages for ACECs and increased restrictions on surface-disturbing activities, OHV driving and hunting opportunities would be reduced. Given the prominence of OHV and hunting recreation in the *Planning Area*, there may be overall losses in local recreation-related expenditures for items such as food, lodging, and equipment. Such impacts would be offset by the continued expenditures associated with ongoing dispersed recreational opportunities and potentially increased visitation/expenditures resulting from SRMA allocation focused on specific recreation niches. SRMA allocation would decrease conflicts between users, improve the recreation setting and experience, and convey to the public that these areas are available as recreation destinations. All these effects could contribute to increases in visitation to developed sites and on public land generally. This would result in gains in fees received by BLM, and more substantially, gains from increased local expenditures in the local communities that would provide services and equipment to visiting recreationists. In addition, the identification of specific recreation areas could contribute to local economic development efforts that are built on tourism.

Lands and Realty: The expansion of right-of-way exclusion areas and designation of a utility corridor could result in denial of some linear developments based on location alone, but would likely streamline the approval/review process. Utility corridor acreage would increase dramatically compared to Alternative A. Cost of development for utility companies could increase if the corridor is not ideally compatible, but commonality of location would increase efficiencies (e.g., established access points). Socioeconomic impacts would be minor, as these utility corridors would be located in sparsely populated areas just east of cities and towns within the *Planning Area*. The utility corridors would pass over existing allotments and could potentially cross over portions of existing ranches; however, it is unlikely that these would pass over attached ranches. This could result in localized impacts on ranching operations.

Land acquisition for ACECs and SRMAs may preclude development on acquired parcels that otherwise would provide site-specific economic development opportunities. Land potentially available for development through land disposal would be reduced by 77 percent when compared to Alternative A. The magnitude of economic loss associated with precluded development opportunity is difficult to predict, given the uncertainties with regard to development and market potential. However, the nonmarket value of undeveloped land, particularly land with values warranting ACEC or SRMA designation, would be expected to offset these losses somewhat.

Renewable Energy: All areas outside of avoidance and exclusion areas designated under this alternative would be potentially available for wind and solar energy development. Impacts of wind energy projects in the *Decision Area* to economics would be the same as those described under Alternative A. The socio-economic impacts of solar development would be extremely varied and would include both benefits and detriments. Reductions in carbon emissions, reduced electricity prices, and employment are benefits. Increases in visual intrusions such as transmission lines and solar fields, and the loss of vegetation and habitats would be considered among the detriments of renewable energy on public lands.

Minerals: A total of 258,186 acres would be non-discretionarily closed under Alternative B. Oil and gas leasing in the remainder of the *Decision Area* would be deferred pending the preparation of a programmatic EIS and RMP amendment fully addressing oil and gas leasing, development and production.

Deferring leasing would have a small and temporary impact on the economy of the three counties since oil or gas potential is low to moderate and no oil or gas has been produced from the existing wells in the *Planning Area*. The economic benefit associated with exploration and well drilling would be foregone. Loss of actual production during the deferral would be highly unlikely. The RFD for the *Planning Area* assumes that no more than 40 wells would be drilled during the life of the RMP and that none of these would be producing wells. Exploration and drilling on existing leases could occur, but there would likely be no production from those leases. Consequently, there would be no economic impact to the counties.

Geothermal leasing would continue, most probably within the high potential area of the Rio Grande corridor. Exploration, drilling, development, and utilization could occur on these leases for the production of geothermal for direct (space or water heating) or indirect (production of electricity) uses. In the past all uses for geothermal resource in this corridor have been for direct application. Consequently, development would be on a relatively small scale and socio-economic benefit would be low.

4.4.7.2.3 Alternative C (Preferred Alternative) Impacts on Socioeconomic Conditions

Special Designations: Impacts would be similar as those described in Alternative B.

Vegetation and Woodlands: Permits for vegetation sale would be authorized in areas designated for disposal or in utility corridors rather than in the existing vegetation sale areas. As with Alternative B, commercial and noncommercial harvest would be specifically tied to improvement of the ecological health of forest and woodlands. If authorized use becomes more restricted due to these policies, there could be minor, localized losses for those who harvest forest, woodland, and plant products.

Livestock Grazing: Alternative C would support the continued viability of ranching and, thereby, the social value of ranching, but there may be slightly less potential for economic gains from livestock ranching under Alternative C as compared to Alternative B. A number of the Alternative C management decisions would improve forage resources available for livestock grazing compared to Alternative B.

Recreation and Visitor Services: As compared to Alternative B, there would be fewer restrictions on motorized travel and hunting and a substantially greater area allocated as SRMAs with specific niche markets. Therefore, the overall impact of this alternative would be similar in magnitude and context to Alternative B, but in comparison would be expected to have increased potential for economic gain from increased recreation use and tourism.

Lands and Realty: The types of socioeconomic impacts associated with right-of-way exclusion and avoidance areas would be similar to those described under Alternative B, except that right-of-way exclusion areas would be reduced to 343,000 acres. Under Alternative C, this could increase the costs for utility companies compared to Alternative A and could decrease this affect compared to Alternative B.

Under Alternative C, socioeconomic impacts associated with utility corridors would be similar to Alternative B; however, there would be 30 percent more acreage designated for this use. Socio-economic impacts associated with land acquisition and disposal would be similar to Alternative B; however, more land would be allocated for disposal.

Renewable Energy: Impacts from solar energy development would be the same as those described under Alternative B. Impacts of wind energy development would be the same as those described under Alternative A.

Minerals: Impacts from fluid mineral leasing and development would essentially be the same as those prescribed under Alternative B.

4.4.7.2.4 Alternative D Impacts on Socioeconomic Conditions

Special Designations: The availability of land not designated as ACEC for commercial use could provide further economic opportunities that may not be associated with outdoor recreation.

Vegetation and Woodlands: Impacts of Alternative D would be the same as those described in Alternative C.

Livestock Grazing: Alternative D impacts would be the same as those described under Alternative A.

Recreation and Visitor Services: There would be more land allocated as SRMAs under Alternative D than under any other alternative. The magnitude and context of the recreation impact would be similar to that of the other alternatives; however, Alternative D would have the greatest potential for recreation-related economic gain as it would provide greater opportunity and the capability to accommodate more people at developed recreation sites.

Lands and Realty: The types of socioeconomic impacts associated with right-of-way exclusion and avoidance areas would be similar to those described under Alternative C, except that restrictions on land use authorization would be slightly greater, potentially resulting in increased costs for utilities. Impacts on utility corridors would be the same as Alternative C. Under this alternative, more land would be allocated for disposal or transferred from BLM administration.

Renewable Energy: Impacts from solar energy would be the same as those described under Alternative B. Impacts of wind energy would be the same as those described under Alternative A.

Minerals: The socioeconomic impacts of deferring oil and gas leasing would essentially be the same as those described under Alternative B. Impacts from fluid mineral leasing and development would be the same as those prescribed under Alternative B.

4.4.8 IMPACTS ON ENVIRONMENTAL JUSTICE

This section addresses the potential for the alternatives to have disproportionate adverse impacts on minority and low-income populations, including direct, indirect, short-term, and long-term impacts. Because the analysis of disproportionate adverse impacts depends on what impacts are identified related to other resources, definitions of adverse impacts as these apply to environmental justice issues are closely related to the definitions of adverse impacts in other resource areas (e.g., social resources). An example of a disproportionate indirect impact could be a reduction in social services to low-income individuals that may result from decreased tax revenues because of decreased mineral production.

In accordance with BLM and Council on Environmental Quality guidance for assessing environmental justice in the planning process, an area would be considered to contain a minority population if either the minority population of the affected area exceeds 50 percent, or the percentage of minority population in the affected area is meaningfully greater than the percentage in the general population.

4.4.8.1 Impacts on Environmental Justice Common to All Alternatives

As noted in Section 3.6, all the counties and communities within the *Planning Area* except for Alamogordo are considered low-income populations. Therefore, essentially any adverse impact to the local area would disproportionately impact low-income populations; however, these adverse impacts would not necessarily disproportionately impact these low-income populations.

A BLM action may impact all of the residents of a particular area, not just low-income or minority communities, so it is difficult to say that there would be disproportionate impacts on communities without a closer understanding of the specific BLM decision. If users of a particular resource are predominately a community of Environmental Justice concern, then there is a higher likelihood of disproportionate adverse impacts on that community, but if the users are diverse then the impacts would be shared by all communities.

The alternatives would be identical with respect to potential impacts on minority and low-income populations. There is no indication that any of the BLM actions proposed in any of the alternatives would cause disproportionate adverse impacts on minority or low-income populations. BLM has considered all input from persons regardless of their race, ethnicity, income status, or other social and economic characteristics.

4.4.8.2 Summary of Impacts on Environmental Justice

Under all alternatives, there is no indication that any of the BLM actions proposed in any of the alternatives would cause disproportionate effects on minority and low-income populations in the *Planning Area*.

4.4.9 IMPACTS ON PUBLIC HEALTH AND SAFETY

Included in the BLM's mission for the management of public land is the reduction of threats to public health, safety, and property. The BLM is required by FLPMA to comply with state standards for public health and safety. Of most concern are the safety impacts related to abandoned mines, debris flows, and hazardous materials. This section describes the potential impacts of hazardous materials on public safety resulting from management actions related to other resources and resource uses. It includes a discussion of the risks associated with hazardous wastes and solid wastes potentially found within the *Planning Area* and possible threats to public safety by natural and manmade hazards.

The presence of hazardous materials and wastes often result from vehicular travel through the *Planning Area*, either as a result of a vehicular accident or from the release of hazardous materials or wastes that the vehicle might be transporting. Recreation activities can result in spills of hazardous materials and waste as well as trash left in areas where recreation al activities occur. Hazardous materials that are used to suppress wildfires could pose a risk if the material is spilled. Prescribed burns that are not properly controlled could threaten public health and safety.

The following assumptions were used when assessing the impacts related to hazardous materials and public safety:

- Facilities on public land within the *Planning Area* that might use some forms of hazardous materials, such as utilities or recreational systems or facilities, would be managed under the specific authorization process for such systems or facilities.

- When the use of hazardous materials becomes necessary, such as for the suppression of wildfires or the elimination of noxious weeds, chemicals would be handled and applied in accordance with the manufacturers' directions. However, spills or releases of hazardous materials or deposition of wastes could occur under other circumstances, such as during transportation of chemicals, from vehicular accidents, or illegal dumping.
- Public safety assessments are evaluations of risk associated with any circumstance. There are no absolute measures of safety.
- Precautions mitigate risk, but accidents and injuries are bound to occur to some extent when human activity takes place.
- In areas where construction or maintenance of motorized routes, fences, campsites, nonmotorized trails, and trailheads, or where any other activity is undertaken, or where the use of hazardous chemicals would be required, appropriate protocol would be followed, thereby decreasing the risk of accident or injury.
- The safety of workers, firefighters, or emergency management teams would be the primary consideration at a rescue site.
- Emergency access may occur throughout the *Planning Area* to protect public safety, though such access would be minimal.

Impact analyses with regard to hazards and public safety are based on the distribution of risk sites or areas, the potential consequences of an accident or incident, and the factors mitigating the risk of an accident or incident. Under all alternatives, the management of air quality, soil and water resources, vegetation, fish and wildlife, special status species, paleontological resources, visual resources, wilderness characteristics, wildfire management, and special designations is not expected to have any impact on public safety or contribute to the presence of hazardous materials or waste on public land.

4.4.9.1 Impacts on Public Health and Safety Common to All Alternatives

Safety risks and hazards would exist to some extent under all alternatives. No management- or implementation-level decisions can eliminate risk, but some varying amount of risk can be realized. Regardless of the risk involved under any alternatives, emergency and rescue operations would be available on an as-needed basis.

Hazardous materials and wastes would be handled and disposed of according to state and Federal requirements under all alternatives. Spills or releases of hazardous materials or wastes could occur under any of the alternatives. If spills or releases occur, the cleanup process would begin and all applicable procedures and reporting requirements would apply.

Impacts to health and safety from oil and gas development would be limited to development of existing leases where the public would be exposed to a hazardous industrial environment, including the dangers associated with hydrogen sulfide gas.

Activities involving mining in areas open to mineral development and exploration could result in accidents or injuries. Installing fencing or other methods to prevent entry to mining sites would limit the potential for injuries and accidents affecting the public. The BLM would work with the State Abandoned Mine Lands program to identify and close and/or render sites safe and would help ensure that program funds are made available. On sites where the BLM shares ownership with other entities, cooperative efforts with the State of New Mexico to address remediation needs would be required. Evaluating all Abandoned Mine Lands sites to determine effective methods for remediation would require substantial effort and funding over the 20-year planning period. Conducting actual remediation efforts would greatly increase costs associated with managing the public health and safety program.

Activities associated with construction and maintenance of utility lines, pipelines, and communication sites could result in accident, injury, or hazardous material spills. The development of roads to construct and maintain these systems or facilities also may provide more access and attract OHV users to the area. These risks would be confined to localized areas.

Threats to public safety can occur from OHV accidents and collisions that cause injuries. Short-term hazardous material spills from damaged OHVs could contaminate soil and water resources in localized areas. Increased use of OHVs could result in a rise in impacts on health and human safety.

4.4.9.2 Impacts of the Alternatives on Public Health and Safety

4.4.9.2.1 Alternative A Impacts on Public Health and Safety

The current BLM programs and policies for management of hazardous waste and public safety would remain in place under Alternative A. Risk to public safety and the potential for deposition of hazardous materials would most likely result from management decisions regarding trails and travel management and the use of OHVs, followed by the development of utility corridors. To a lesser extent, mineral development could also impact risks.

Comprehensive Trails and Travel Management: Managing 1.64 million acres as open to cross-county OHV use could cause an increase in the volume of OHV users, thereby potentially increasing the rate at which accidents occur either from collisions with other vehicles or visitors on foot, or from driving into an unknown abandoned mine feature. Designating 19,000 miles of routes as open to OHV use could have the same impacts.

Recreation and Visitor Services: Designating SRMAs could manage risks to public health and safety due to increased monitoring and management. Closure of 10,444 acres (0.37 percent of *Decision Area*) within ½-mile of developed recreation sites to the discharge of firearms promotes safety in areas with higher visitation rates and a concentration of visitors.

Lands and Realty: Utility and transportation corridors pose a potential risk to public safety from the risk of injury from electric power lines and structures. Developed utility corridors could attract OHV users and increase access to the area, thereby increasing the risk of injury or accident. As garbage often collects near utility structures, there is the possibility that hazardous wastes could be found among the discarded items. Accidents and injuries also may occur during construction of utility lines and pipelines.

Minerals: Activities associated with fluid-mineral and geothermal development could result in a risk to public safety. Development of leases could pose the risk of injury, accident, or hazardous materials spills, especially during drilling activities and machinery operation, however, a very small number of wells would be developed. Injuries may also occur from drill-pad construction, fires, or explosions. Allowing fluid-mineral development in areas with leasing stipulations of CSU and NSO would reduce risks because of increased management.

4.4.9.2.2 Alternative B Impacts to Public Health and Safety

Comprehensive Trails and Travel Management: Under Alternative B, 39,000 acres would remain open to OHV use. These management decisions and the closing of 260 miles of routes would decrease OHV use and route access compared to Alternative A. As a result, the potential number of injuries and

accidents from OHV use would be reduced. Limiting vehicle use on 99 percent of the *Decision Area* to existing or designated routes would help to prevent collisions with other users, or driving into a mine shaft or pit.

Likewise, the possible release of hazardous materials during OHV accidents would be reduced. The acres designated as would increase due to the closure of vehicle routes within ½-mile of riparian and arroyo habitats and vehicle routes within WSAs. Additional closed acres associated with WSAs and riparian/arroyo habitats would reduce the potential for accident and injury when compared with Alternative A.

Recreation and Visitor Services: Closure of 44,770 acres (1.5 percent of the *Decision Area*) within ½-mile of developed recreation sites to the discharge of firearms promotes safety in areas with higher visitation rates and a concentration of visitors. Analysis and background information for closures of these recreational sites to discharge of firearms is further described in Appendix N. Alternative B closures to discharge of firearms and target shooting would be more restrictive than Alternative A.

Lands and Realty: Establishing 150,000 acres of utility corridors in Alternative B would create greater impact on public safety by increasing access for OHV users, which would lead to an increased risk of injury from utility lines or hazardous waste associated with vehicles and garbage.

Minerals: Under Alternative B, special designations such as WSAs and ACECs would be closed to oil and gas leasing. Oil and gas leasing would be deferred in the remainder of the *Decision Area* until a programmatic EIS addressing oil and gas leasing is prepared after the *TriCounty* RMP is completed. Areas with known geothermal potential would continue to be open for geothermal resource development. This could potentially cause injury during development activities.

4.4.9.2.3 Alternative C (Preferred Alternative) Impacts on Public Health and Safety

Comprehensive Trails and Travel Management: Impacts on public health and safety under Alternative C from OHV use would be greater than those under Alternative B due to the decrease in acres designated as closed. This would increase the potential for accidents and injury compared to Alternative A. Designating areas as open to OHV use would have the same impacts as Alternative B. Under Alternative C, 15 miles of routes would be designated as closed compared to 260 miles under Alternative B, which would increase the risk of accident or injury.

Recreation and Visitor Services: Closure of 44,770 acres (1.4 percent of the *Decision Area*) within ½-mile of developed recreation sites to the discharge of firearms promotes safety in areas with higher visitation rates and a concentration of visitors (Appendix N). Alternative C closures to discharge of firearms and target shooting are similar to Alternative B and more restrictive than Alternative A.

Alternative C closures to discharge of firearms and dispersed recreational target shooting would be more restrictive than Alternative A and slightly less restrictive than B. This would have the same effects as discussed under Alternative B, except for the impacts on the Doña Ana Mountains SRMA. Closing only the southern portion of the Doña Ana Mountains SRMA to discharge of firearms and dispersed recreational target shooting would promote safety in the most heavily visited portion of the SRMA while allowing the discharge of firearms to continue in the northern portion. The northern portion of the SRMA receives fewer visitors.

Lands and Realty: Impacts to public health and safety would be the same as those described under Alternative B but would occur over 209,000 acres (30 percent greater than Alternative B).

Minerals: Impacts from mineral development would be the same as those under Alternative B.

4.4.9.2.4 Alternative D Impacts to Public Health and Safety

Comprehensive Trails and Travel Management: Impacts under Alternative D would be similar to those experienced under Alternative C, except increasing areas managed as limited to existing routes would lead to an increase in accident and injuries and release of hazardous materials. Closing 14 miles of routes would have the same impacts as Alternative C and could increase the risk of accident or injury compared to Alternative B and decrease this risk compared to Alternative A.

Recreation and Visitor Services: Closure of 37,500 acres (1.3 percent of the *Decision Area*) within ½-mile of developed recreation sites to the discharge of firearms promotes safety in areas with higher visitation rates and a concentration of visitors (Appendix N). Alternative D would be similar to Alternative C, however, Tularosa Creek SRMA, which is not proposed in Alternatives B or C, would be closed to firearms. Also, the Doña Ana Mountains SRMA and Dog Canyon Road would be closed only to dispersed recreational target shooting, which has posed a safety threat to the recreating public.

Lands and Realty: Impacts from utility corridors across 225,000 acres would be the greatest under Alternative D.

Minerals: Impacts from mineral development would be the same as under Alternative B.

4.5 CUMULATIVE IMPACTS

Cumulative impacts are the effects on the environment that result from the impact of implementing any one of the alternatives in combination with other actions outside the scope of this plan, either within the *Planning Area* or outside it. The Council on Environmental Quality regulations for implementing NEPA defines cumulative impacts as follows:

> *…the impact on the environment which results from the incremental impact of the action when added to other past, present, or reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time. (40 CFR 1500-1508)*

Cumulative impact analysis is required to evaluate the environmental conditions that result from many different factors that act together. The real effect of any single action cannot be determined by considering that action in isolation, but must be determined by considering the likely result of that action when operating in conjunction with many others. Management decisions may well be influenced by activities and conditions on intermingled nonpublic land and on adjacent land beyond the *Planning Area* boundary. Assessment data and information may span multiple scales, land ownerships, and jurisdictions.

4.5.1 CUMULATIVE ANALYSIS METHODOLOGY

The cumulative impacts discussion that follows considers the alternatives in the context of the broader human environment and, specifically, actions that occur outside the scope and geographic area covered by the *Decision Area*. Because of the comprehensive nature of the RMP, this assessment is broad and generalized to address potential effects that could occur from the alternative management actions when combined with other activities or projects.

Cumulative impact analysis is limited to important issues of national, regional, or local significance. Therefore, not all issues identified for direct or indirect impact assessment in this EIS are analyzed for cumulative effects. Because of the wide geographic scope of a cumulative impact assessment and the variety of activities assessed, cumulative impacts are commonly examined at a more qualitative and less detailed level than are the direct and indirect impacts presented previously in this chapter.

The spatial boundaries of each resource's cumulative analysis, known as the cumulative impact analysis area, vary by resource and are larger for resources that are mobile or migrate (e.g., air quality or wildlife species) compared to resources that are stationary (e.g., paleontological resources or minerals). The spatial boundaries of resources and resource uses may be contained within the *Decision Area* or *Planning Area* or may extend beyond the *Planning Area*. Evaluation of potential impacts considers incremental impacts that may result from the proposed project, while also considering impacts from past, present, and reasonably foreseeable future actions. Reasonably foreseeable future actions are those future actions that have been committed to or that are known proposals that could take place within the 20-year planning period. These projections, which have been developed for analytical purposes only, are based on current conditions and trends and represent best professional estimates.

Projects and activities are evaluated based on proximity, connection to the same environmental systems, potential for subsequent impacts or activities, similar impacts, and whether the project is reasonably foreseeable. Descriptions of past, present and reasonably foreseeable actions are included in Table 4-8.

TABLE 4-8
PAST, PRESENT, AND REASONABLY FORESEEABLE FUTURE ACTIONS[1]

PROJECT/ACTION	DESCRIPTION OF THE ACTION
PAST ACTIONS (1800S SETTLEMENT TO 1950)	
COMMUNITY SETTLEMENT	The Mesilla Valley has a long and important history in New Mexico. Following its initial population by Native Americans, the Mesilla Valley was inhabited by the Spanish party of Friar Agustin Rodríguez in 1581. After the 1848 Treaty of Guadalupe Hidalgo, which signaled the end of the Mexican War, a colony of individuals not desiring American citizenship moved across the Rio Grande and established the town of Mesilla. The Mesilla area was seen as an ideal location for a railroad route to the Pacific, which would connect the rest of the United States to California. The Gadsden Treaty was signed on December 30, 1853, after the region was purchased for $10 million, resulting in the addition of Mesilla to Doña Ana County. The railroad was routed through Las Cruces instead, and that city eventually replaced Mesilla as the County seat. Alamogordo was established as a railroad hub in 1898 and is the seat of Otero County. Truth or Consequences, originally known as Hot Springs, grew up around the construction of Elephant Butte Dam in 1912, although the area had long been inhabited by Apache and Spanish settlers.
LIVESTOCK GRAZING AND RANGELAND IMPROVEMENTS	Ranching and livestock grazing has been a predominant use of the land since the 1880s, when railroads arrived in the territory. Historically, grazing on public land has been authorized and numerous rangeland improvements such as fencing and watering sources have been developed.
TAYLOR GRAZING ACT OF 1934	The Taylor Grazing Act of 1934 (Title 43 United States Code Section 315), signed by President Roosevelt, was intended to "*stop injury to the public grazing lands by preventing overgrazing and soil deterioration; to provide for their orderly use, improvement, and development; to stabilize the livestock industry dependent upon the public range*." BLM was now required to allot grazing permits to ranchers and monitor and enforce grazing allowances. Additionally, a portion of the fees collected for grazing livestock on public land was returned to the appropriate grazing district to be used for range improvements.

TABLE 4-8 PAST, PRESENT, AND REASONABLY FORESEEABLE FUTURE ACTIONS[1]	
PROJECT/ACTION	**DESCRIPTION OF THE ACTION**
WATER DEVELOPMENT, ELEPHANT BUTTE AND CABALLO RESERVOIR	The Territorial Legislature of New Mexico passed a law providing for the creation of a water users' association that met the Federal requirements to establish these associations on United States reclamation projects. A convention was held on May 21, 1906, between the US and Mexico determining that 60,000 acre-feet of water would be sent annually to Juárez, Mexico, from the proposed reservoir at Elephant Butte.
RIO GRANDE CANALIZATION PROJECT	The Rio Grande Canalization Project was constructed between 1938 and 1943 in southern New Mexico, continuing west to Texas. The project provides protection against a 100-year flood and assures releases of waters to Mexico from in accordance with the 1906 convention. It extends 106 miles along the Rio Grande from the Percha Division Dam below Caballo Dam in New Mexico southward into Texas below El Paso.
CLIMATIC EVENTS	Severe droughts occurred in 1916-18, 1921-26, 1934, 1951-57, and 2007-2012. The 1951-57 drought and the current drought are believed to have been the most severe in the past 350 years. Floods occurred on the Rio Grande in 1904, 1905, 1929, 1935, and 1941 (NOAA 2012).
ESTABLISHMENT OF JORNADA EXPERIMENTAL RANGE	The BLM Jornada Experimental Range, established in 1911, is an area of 302 square miles located in the Chihuahuan Desert in Doña Ana County. The Jornada is an important site for research on the health of desert rangelands in the western US. These research projects provide important information for the management of desert rangelands in southern New Mexico.
MESCALERO APACHE INDIAN RESERVATION	The headquarters of the Mescalero Apache Indian Reservation is in the town of Mescalero, on U.S. Highway 70, 17 miles northeast of Tularosa. The present reservation was established in 1883, covering 463,000 acres between the White and Sacramento mountains, all in Tribal ownership status.
MILITARY BASES: FORT BLISS, TEXAS; HOLLOMAN AIR FORCE BASE, WHITE SAND PROVING GROUNDS, NEW MEXICO	Established in 1848, Fort Bliss is located on 1.12 million acres of land extending across Texas and New Mexico. With the US entry into the World War I, Fort Bliss was garrisoned by a Provisional Cavalry division. Holloman Air Force Base was established in 1942 as Alamogordo Air Field, 6 miles west of Alamogordo. Located east of Las Cruces and later renamed White Sands Missile Range, the White Sands Proving Grounds was established in July 1945. The 3,200-square-mile range is where the first atomic bomb was tested in 1945.
WHITE SANDS NATIONAL MONUMENT	President Herbert Hoover proclaimed and established the White Sands National Monument on January 18, 1933. The area is in the Tularosa Basin and comprises the southern part of a 275-mile-square field of white sand dunes of gypsum crystals. In its first year, the monument attracted 12,000 people, and by 1948 the number increased to more than 100,000 per year.
PRESENT ACTIONS (1950s THROUGH 2012)	
COPPER FLAT MINE	Copper mining has been pursued in the Copper Flats area northwest of Hillsboro since the mid-1950s, beginning with a small copper leaching operation and exploration. Exploration continued into the 1970s when sufficient reserves were identified. In 1982, an open pit copper mine was developed and operated for just 3 months. In 2010, an MPO was submitted to LCDO from the New Mexico Copper Company and an EIS is underway.
CURRENT RANCHING ACTIVITIES	Ranching continues to take place on public land within the *Planning Area*. The Federal Rangeland Improvement Act of 1978 improved grazing allotment management for the BLM. Most of the public land in the *Planning Area* is grazed by livestock. Livestock production has declined in recent years due to the low market and the current drought. Currently in New Mexico livestock grazing on public land is guided by the *New Mexico Standards for Public Land Health and Guidelines for Livestock Grazing Management* (USDOI BLM, 2000a)

TABLE 4-8 PAST, PRESENT, AND REASONABLY FORESEEABLE FUTURE ACTIONS[1]	
PROJECT/ACTION	**DESCRIPTION OF THE ACTION**
WILDERNESS ACT OF 1964	Congress passed the Wilderness Act of 1964, which directed the Secretary of Agriculture to establish guidelines for wilderness.
BLM COMMUNITY PIT NO. 1	The BLM closed the rock quarry west of Las Cruces, known as Community Pit No. 1. The "*pit*" has operated since 1969 and has been a source for building stone of limestone and siltstone. Over the past several years, however, neighbors raised concerns about air and noise pollution, and diminishing property values. BLM has long-term plans to reclaim the quarry; in the meantime the area will remain closed.
PREHISTORIC TRACKWAYS NATIONAL MONUMENT	The Prehistoric Trackways National Monument was established in 2009 to conserve, protect, and enhance the unique and nationally important paleontological, scientific, educational, scenic, and recreational resources and values of the Robledo Mountains in southern New Mexico. The Monument includes a major deposit of Paleozoic Era fossilized footprint megatrackways within approximately 5,280 acres. An RMP is being written for Monument.
RESTORATION ALONG THE RIO GRANDE TO IMPROVE RIPARIAN HABITAT, WATER QUALITY, AND WATER QUANTITY	Restoration improvements along the Rio Grande include reducing the consumptive water use of floodplain vegetation by improving riparian habitat. Current activities include removing salt cedar and planting native vegetation that will enhance riparian habitat and require less water. Other current and ongoing restoration activities include grade control and sediment capture structures, relocating diversions, and reconnecting channels and floodplains.
SANTA TERESA LAND EXCHANGE	In 2008, the BLM Las Cruces District Office and the Roswell Field Offices completed a land exchange with the New Mexico State Land Office. The land exchange involved state lands in Doña Ana and Chaves counties for BLM-managed land in Doña Ana County to be used for possible realignment of county roads, utility line relocations and a proposed railroad facility.
DESALINATION PLANTS	A new water desalination plant was constructed on Fort Bliss, east of El Paso International Airport. The facility has been part of the water-supply system for the City of El Paso. Two other plants are in development in Alamogordo: the Tularosa Basin National Desalination Research Facility and the Alamogordo Municipal Desalination Plant. The Alamogordo Municipal Desalination Plant would process water from a well field proposed on public land about 10 miles north of Tularosa.
NONNATIVE PHREATOPHYTE/ WATERSHED MANAGEMENT PLAN	The *Nonnative Phreatophyte/Watershed Management Plan* focuses on the prevention and control of tamarisk and associated nonnative invasive plants with the ultimate goal of restoring healthy, productive ecosystems. The plan will facilitate management and implementation of future control practices and rehabilitation efforts in New Mexico's watersheds and riparian areas.
NEW MEXICO ENVIRONMENTAL DEPARTMENT WATERSHED RESTORATION ACTION STRATEGY	The Watershed Restoration Action Strategy grant for the Lower Rio Grande watershed, enabled under the Clean Water Act, Section 319(h), provides an opportunity for the New Mexico Department of Agriculture to list specific water quality problems in the Lower Rio Grande, and it identifies the contaminants that are causing these problems and their sources. Strategies have been developed to improve watershed conditions through best management practices.
MINE RECLAMATION IN THE JARILLA MOUNTAINS	New Mexico's Abandoned Mine Lands Program closed mine features in the Orogrande Mining District that are easily accessible and pose a hazard to the public through 1) backfilling using surrounding waste rock or imported, clean fill; 2) structural closures, or 3) fencing. The project area is located in the south-central portion of the Jarilla Mountains in southwest Otero County.

TABLE 4-8 PAST, PRESENT, AND REASONABLY FORESEEABLE FUTURE ACTIONS[1]	
PROJECT/ACTION	**DESCRIPTION OF THE ACTION**
NEW MEXICO GAME AND FISH COMPREHENSIVE WILDLIFE CONSERVATION STRATEGY	The New Mexico Comprehensive Wildlife Conservation Strategy identifies species and habitats of greatest conservation concern in the State. Its focus is on Species of Greatest Conservation Need (SGCN), key wildlife habitats, and the conservation of both. The desire is that New Mexico's key habitats persist in the condition, connectivity, and quantity to sustain viable populations of SGCN.
EXTRATERRITORIAL ZONING	The New Mexico State Legislature enacted a statute that allows any municipal governing body or the board of county commissioners of any county to create Extraterritorial Zoning areas around cities. The State law allows for such joint planning in areas outside unincorporated cities. In 1989, the City of Las Cruces and Doña Ana County established an Extraterritorial Zoning for joint City and County planning, zoning, and subdivision approval. Joint planning is necessary due to the rapid suburban growth outside cities.
COUNTY COMPREHENSIVE PLANS	The *Doña Ana County Comprehensive Plan* was adopted in 1994 and Otero County adopted a final comprehensive plan in 2005. The goals of the comprehensive plan are to provide basic infrastructure, maintain and protect the County's resources, provide community systems or facilities and services, promote economic development and employment opportunities, adopt and implement a land use plan, encourage affordable housing and a variety of housing types, and improve intergovernmental relations.
LAS CRUCES PARKS AND RECREATION MASTER PLAN (2005 DRAFT)	The *Las Cruces Parks and Recreation Master Plan* (2005) guides operations, maintenance, and recreation programming needs through an extensive needs assessment, a community input process, a citizen's survey, and a comprehensive evaluation of all existing facilities and future land acquisition for park development. One of the goals of the plan is to support the recommendations of the Citizens' Task Force for Open Space Preservation, with input from the Open Space and Trail Network's strategies for this goal, which include creating regional development and conservation guidelines for resources that cross jurisdictional boundaries, such as an arroyo protection plan, a hillside and escarpment protection plan, a wildlife conservation plan, and a farmland conservation plan.
LAS CRUCES DEVELOPMENT	While government is the largest employment sector in Doña Ana County, the economy continues to diversify. As a regional trade, education, and health care center, the county's employment continues to grow in most sectors, with education and health services growing at the lead. Of the county's largest employers, two are government testing facilities, and three are education systems, with one each in local government, health services, and retail trade. Other major employers are in the manufacturing, leisure, hospitality, and information sectors.
LAS CRUCES METROPOLITAN PLANNING ORGANIZATION	The Las Cruces Metropolitan Planning Organization (MPO) was established in 1982 and is a multijurisdictional agency responsible for transportation planning in Las Cruces, Mesilla, and parts of Doña Ana County. Federal regulations require the designation of an MPO to carry out a coordinated, continuing, and comprehensive transportation planning process for urbanized areas with a population of more than 50,000. The MPO also is responsible for planning all aspects of the transportation system, including roads, bicycle and pedestrian systems or facilities, public transit, and the airport. The MPO develops and updates a long-range transportation plan for the Las Cruces area, focusing on mobility and access, efficient system performance, and quality of life.
WATER-SUPPLY PROJECTS	*Elephant Butte Irrigation District:* In 1979, the Elephant Butte Irrigation District assumed control over the operation and maintenance of ditches and canals within its district. However, the U.S. Bureau of Reclamation remained in charge of the reservoir, dam, and diversion dams.

TABLE 4-8
PAST, PRESENT, AND REASONABLY FORESEEABLE FUTURE ACTIONS[1]

<table>
<tr><th>PROJECT/ACTION</th><th>DESCRIPTION OF THE ACTION</th></tr>
<tr><td>SPACEPORT AMERICA</td><td>Spaceport America is being constructed on state land between the Upham exit from I-10 and Engle in the Jornada Basin. Virgin Galactic plans on locating its world headquarters and mission control for its personal spaceflight business at the Spaceport complex. The facility will be built on 27 square miles in Upham, New Mexico, about 45 miles northeast of Las Cruces. All construction, with the exception of improvements to some existing access roads such as County Road A013 and installation of a power transmission line and fiber optic cables to the project site, would take place on New Mexico State Trust Land. Off-site access roads, transmission line, and fiber optic cables would cross a mix of State Trust, BLM, and private lands (FAA 2008).</td></tr>
<tr><td>WEST-WIDE ENERGY CORRIDOR PROGRAMMATIC EIS</td><td>The West-Wide Energy Corridor Programmatic EIS evaluated potential impacts associated with the proposed action to designate corridors on Federal land in 11 western states for oil, gas, and hydrogen pipelines and for electricity transmission and distribution facilities. The Programmatic EIS did not change any corridor designations in the Planning Area.</td></tr>
<tr><td>UNION PACIFIC SANTA TERESA RAIL YARD</td><td>Construction of a rail yard in southern Doña Ana County on 2,200 acres includes fueling facilities, crew change buildings, and intermodal yard for unloading containers onto trucks. Up to 600 jobs will be based at the facility.</td></tr>
<tr><td colspan="2">REASONABLY FORESEEABLE FUTURE ACTIONS (2012 TO 2027)</td></tr>
<tr><td>PROJECTED POPULATION GROWTH</td><td>The population of all three counties is anticipated to increase through the life of the plan. Below are population projections for the TriCountyResource Management Plans/Environmental Impact Statement (EIS) Planning Area.
<table>
<tr><th></th><th colspan="5">Population Projections by Year</th></tr>
<tr><th>County</th><th>2010</th><th>2015</th><th>2020</th><th>2035</th><th>2030</th></tr>
<tr><td>Sierra</td><td>12,502</td><td>12,972</td><td>13,380</td><td>13,729</td><td>14,046</td></tr>
<tr><td>Otero</td><td>61,057</td><td>62,700</td><td>64,227</td><td>65,481</td><td>66,238</td></tr>
<tr><td>Doña Ana</td><td>227,009</td><td>253,548</td><td>282,152</td><td>313,073</td><td>345,458</td></tr>
</table>
SOURCE: Bureau of Business and Economic Research, University of New Mexico (2002 [revised 2004])</td></tr>
<tr><td>FORT BLISS EXPANSION</td><td>Fort Bliss' mission has changed from primarily air defense artillery training to armored and infantry unit training beginning in 2007. The expansion consists of 300 buildings with 10 million square feet of space including a $400 million combat aviation brigade. Fort Bliss has grown to 30,000 soldiers over the past 10 years. New and upgraded facilities and infrastructure were added to support the additional personnel, and their dependents.</td></tr>
<tr><td>VISION 2040 REGIONAL PLANNING PROJECT</td><td>The Vision 2040 comprehensive regional plan is the first long-range regional plan to include Doña Ana County and its four municipalities: the City of Las Cruces, Village of Hatch, Town of Mesilla, and City of Sunland Park. The 2012 study addressed growth-related issues, such as transportation, utilities and water, economic development, affordable housing, environmental protection, hazard mitigation, and intergovernmental cooperation. The recommendations from the regional study will be used for the second phase of the project: updates to the City of Las Cruces' and Doña Ana County's comprehensive plans.</td></tr>
</table>

NOTE:
1. Refer to Chapter 2 for present management activities and Chapter 3 for additional information on present actions and the affected environment.

4.5.2 CUMULATIVE IMPACTS BY RESOURCE

4.5.2.1 Special Designations

As development of public, private, and State land continues, the importance of protecting special designations would increase. The values of ACECs, WSAs, Historic Trails and Back Country Byways, public parks and open space increase as development proceeds in surrounding areas. Population growth and development could increase the number of people drawn to the areas with special designations for their recreational opportunities, open space, and undeveloped characteristics. This could impact wilderness values of naturalness and solitude in WSAs from increased visitation. Use or development of non-Federal land inholdings within WSAs could result in the loss of wilderness characteristics in portions of these areas.

The cumulative impact analysis area for the Lake Valley Back Country Byway is the extent of the route. Cooperating with the managing authorities of the Byway to protect and preserve the associated landscape values would maintain and enhance these values and provide opportunities for heritage tourism. The current and potential future development of wind farms in the area would impact the viewshed from the Byway, and diminish the historical setting. Increases in trucks and other vehicles associated with the Copper Flat Mine would also diminish the experience on the Byway.

4.5.2.2 Air Resources

4.5.2.2.1 Air Quality

Within the *Planning Area*, three potential impacts on air quality are long-range visibility, ambient concentrations of regulated air pollutants, and deposition of soluble air pollutant compounds. Generally, these impacts are the result of long-distance transport of pollutants from larger emission sources in the region. Projects and activities that may cumulatively impact air quality in the *Planning Area* are the anticipated population growth in Doña Ana County and expansion of the U.S. Army installations at Fort Bliss in El Paso, TX and White Sands Missile Range. The population of Doña Ana County is projected to more than double from 1990 to 2015. Growth beyond public land is likely to continue to impact the quality of air resources. In the long-term, fugitive dust, particulates, noise, and engine exhaust contaminants would increase with population. Under the "Grow the Army" initiative the number of military personnel at Ft Bliss has more than doubled in the past 10 years. This growth is likely to result in more transit-related pollution, increased use of recreation areas within the *Planning Area*, and a demand for additional power generation. These projects have the potential to affect visibility and result in increased ambient concentrations and deposition of air pollutants within the *Planning Area*.

The cumulative impact of the existing and future transportation projects and projected motorized travel is difficult to anticipate. Regional transportation projects, vehicle traffic and OHV use could increase criteria pollutant and greenhouse gas emissions and generate dust that would impact visibility.

Ozone is a pollutant of concern, particularly in Doña Ana County, and the growth and expansion described above will result in emission of pollutants that are ozone precursors. The County is in nonattainment for the 2008 8-hour ozone standard and EPA and NMED have imposed stricter air permitting requirements and require offsets for new sources to bring the area back into attainment.

4.5.2.2.2 Climate Change

Emission of GHGs is a cumulative issue with potential long-term effects. Although emission of GHGs from activities in the *Planning Area* will contribute to the total greenhouse gases in the global pool, models used by climate scientists are not precise enough to predict impacts on climate or the natural environment from emissions occurring from a specific region, or determine effects in a localized area.

Global mean surface temperatures increased nearly 1.0°C (1.8°F) from 1890 to 2006 (Goddard Institute for Space Studies, 2007b). However, observations and predictive models indicate that average temperature changes are likely to be greater in the Northern Hemisphere. Without additional meteorological monitoring systems, it is difficult to determine the spatial and temporal variability and change of climatic conditions, but increasing concentrations of greenhouse gases (GHGs) are likely to accelerate the rate of climate change.

In 2007, the Intergovernmental Panel on Climate Change (IPCC) predicted that by the end of the 21st century, global average surface temperatures would increase 1.1 to 6.4°C (2.0 to 11.5°F) above 1980-1999 levels under a range of potential emissions scenarios (IPCC 2007b). The US Global Change Research Program in its *2009 Report on Global Change Impacts in the United States* explains that where actual warming falls within this range depends on the future level of emissions and the sensitivity of climate systems to those emissions. The *US Global Change Research Program Report* indicates that most of the US will experience greater warming in summer than winter although Alaska will experience more warming in winter. It is not, however, possible to predict with any certainty regional or site-specific effects on climate relative to the proposed lease parcels and subsequent actions.

Potential impacts to natural resources and plant and animal species due to climate change are likely to be varied, including those in the southwestern US. If global climate change results in a warmer and drier climate, increased particulate matter could result from increased windblown dust from drier and less stable soils. Cool season plant species' spatial ranges are predicted to move north and to higher elevations. Extinction of endemic threatened or endangered plants may be accelerated. Due to loss of habitat or competition from other species whose ranges may shift northward, the population of some animal species may be reduced or increased. Less snow at lower elevations may change snowmelt conditions, which could impact water resources and species dependent on historic water conditions.

When compared to baseline information for 1961-1990, periods between 1991 and 2005 show temperature increases in over 95 percent of the geographical area of New Mexico. Warming is greatest in the northwestern, central, and southwestern parts of the State (Enquist and Gori 2008).

The assessment of GHG emissions, their relationship to global climatic patterns, and the resulting impacts is an ongoing scientific process. The inconsistency in results of scientific models used to predict climate change at the global scale coupled with the lack of scientific models capable of predicting climate change on regional or local scales, limits the ability to quantify potential future impacts of decisions made at this level. Determining the significance of any discrete amount of GHG emissions is beyond the limits of existing science. However, scientists are increasingly able to isolate likely scenarios for climate change and its impacts on a regional scale. The *U.S. Global Change Research Program Report on Impacts of Climate Change in the United States* (2009) focuses on broad areas of the country and greatest points of vulnerability as well as looking at climate change impacts in different sectors of the economy. In the Southwest, a particular concern is the uncertainty around precipitation and the potential for extended periods of drought stressing already uncertain water supplies.

When the Intergovernmental Panel on Climate Change (IPCC) released its Climate Change 2007 Report, it named carbon dioxide (CO_2) the most important human produced greenhouse gas. The report

confirmed that the high levels of CO_2 in our atmosphere are caused by fossil fuel emissions and are a major contributor to global warming. Several options will be needed to moderate CO_2 levels in the atmosphere. One approach to lowering atmospheric CO_2 levels, called *Terrestrial Carbon Sequestration*, includes planting vegetation or enhancing an already present ecosystem to increase CO_2 absorption. This gradual, long-term strategy allows us to absorb CO_2 while rehabilitating ecosystems.

Vegetation and soils are widely recognized as carbon storage sinks. The global biosphere absorbs roughly 2 billion tons of carbon annually, an amount equal to roughly one third of all global carbon emissions from human activity. Terrestrial carbon sequestration is defined as either the net removal of CO_2 from the atmosphere or the prevention of CO_2 net emissions from the terrestrial ecosystems into the atmosphere. There are two fundamental approaches to sequestering carbon in terrestrial ecosystems: Protection of ecosystems that store carbon so that carbon stores can be maintained or increased; and manipulation of ecosystems such as vegetation conversion to increase carbon sequestration beyond current conditions.

These two approaches are carried out within the multiple-use practices of BLM through proper grazing management and treatment of degraded grasslands to restore sites to their natural capability and increase productivity. Proper grazing management has been estimated to increase soil C (carbon) storage on US rangelands from 0.1 to 0.3 Mg C $ha^{-1}year^{-1}$ and new grasslands have been shown to store as much as 0.6 Mg C $ha^{-1}year^{-1}$. Grazing lands are estimated to contain 10-30 percent of the world's soil organic carbon (Schuman, et al. 2001). Since 2005 under the Restore New Mexico Program, the Las Cruces District Office has completed approximately 371,000 acres of brush control, including creosote bush, mesquite and piñon/juniper, and grassland restoration projects. Restore New Mexico is an aggressive partnership among BLM, private landowners, and other Federal, State and local agencies and organizations to restore New Mexico's grasslands, woodlands and riparian areas to a healthy and productive condition.

Given the size of the carbon pool in grazing lands there is a need to better understand current and potential effects of management on soil carbon storage (Schuman, et.al.). When further information on the impacts to climate change is known, such information would be incorporated into the BLM's planning and NEPA documents as appropriate. The alternatives in this RMP include performing wildfire management, providing access for recreation, (including OHV use) , and implementing a variety of land management practices, which result in emissions of greenhouse gases including CO_2, CH_4, and N_2O. GHG emissions from the *Planning Area* in combination with emissions from other regional and global sources have the potential to influence climate change.

The net effect of these actions would be e negligible differences in cumulative impacts on air resources from the BLM activities proposed under each of the alternatives.

4.5.2.3 Soil and Water

Surface disturbance and loss of vegetation are the main contributors to decreased soil productivity and increased soil erosion. With the increase in residential, commercial, and industrial development, OHV users may create new trails in areas that had not previously been disturbed, which could lead to further soil disturbance. In addition, expanded military ground operations and development at White Sands Missile Range and Fort Bliss would directly impact soil resources through surface disturbance and compaction and could increase erosion.

Municipalities and water districts are the major water users within the *Planning Area*, and there would be negligible differences from BLM actions proposed under any alternative on water quantity. Water quality and quantity on public land may be affected by offsite use, recreation activities, development, and agricultural uses regardless of the RMP alternative selected.

Certain technologies for solar energy development can consume large amounts of groundwater. Cumulative impacts could cause a drawdown of the water table in the Mesilla.

4.5.2.4 Vegetation and Woodlands

Current and future county-wide planning would improve vegetation on BLM lands in the *Planning Area*. Long-range planning for community expansion with best management practices and zoning would limit sprawl, improve road placement, and create parks and open space that would concentrate activities in some areas and relieve impacts to vegetation on BLM land such as fragmentation caused by poorly planned roads, trash dumping and off-road vehicle use

Rangeland improvements, such as water and fencing, have improved livestock distribution and reduced livestock concentrations which would have degraded vegetation. Rio Grande restoration projects have reduced invasive species and enhanced native riparian communities. Mine reclamation in the Jarillas has increased vegetation resources throughout the Oro Grande mining district.

Current management of livestock, vegetation and wildlife is intended to facilitate achievement of the standards for public land health. The implementation of BLM's mitigation guidelines, restrictions on surface use, and *New Mexico Standards and Guidelines*; NMDGF's *Comprehensive Wildlife Conservation Strategy for New Mexico;* and the New Mexico Department of Agriculture's Watershed Restoration Action Strategy and *Nonnative Phreatophyte/Watershed Management Plan* would help improve riparian and upland vegetation under all alternatives.

Increased military activities, industrial development, and expanded urban areas disturb soil and vegetation on private, military, and state lands near public lands. Vegetation decreases on adjacent or surrounding lands increase soil erosion and vegetation loss on public land. Increased urban development may lead to increases in cross-country vehicle use which would compact or destroy vegetation in those areas closest to homes and businesses despite comprehensive planning efforts.

4.5.2.5 Fish and Wildlife Habitat

Fish and wildlife resources on public land may be affected by offsite use and development regardless of the RMP alternative selected. Surface-disturbing activities from increased commercial and residential development related to population growth and increased military operations could degrade soils and remove vegetation. Expansion of Fort Bliss and overall growth in the region's population and its commercial and residential development could alter fish and wildlife habitat and introduce more surface disturbances from recreation. Disturbances could be offset somewhat by regional planning efforts such as the Vision 2040 Regional Planning Project in Doña Ana County and the 2005 *Las Cruces Parks and Recreation Master Plan.*

The conversion of land use from agricultural land to residential and commercial uses would decrease the habitat values of the remaining undeveloped land. The change in land use could result in the loss of habitat for some fish and wildlife species. The BLM's implementation of HMPs could offset the effects of growth and surface disturbances, and nongame species management could potentially protect or

improve more types of habitats than management either for native game species alone or for a combination of native and nonnative species.

4.5.2.6 Special Status Species

Appropriation of water for beneficial use (which does not include wildlife) has historically reduced aquatic habitats in the *Planning Area* substantially. On lands managed by the BLM, objectives for maintaining and enhancing the special status species habitat for aquatic and riparian species would contribute to the maintenance of viable populations. Upland restoration projects in Chihuahuan Desert Grasslands would play a substantial role in maintaining populations of species dependent on this ecosystem. Management of ACECs, buffer areas for raptors and prairie dogs and other special species, and seasonal closures to protect species would prevent disturbances caused by rights-of-ways or other activities.

Special status species habitat on public land may be affected by offsite use and development regardless of the RMP alternative selected. Surface-disturbing activities from increased commercial and residential development related to population growth and increased military operations could compact soil; reduce rates of water infiltration; increase wind erosion, water erosion, and sedimentation of streams; and remove vegetation that supports special status species habitat. The change in land use could result in the loss of habitat for some special status specie both on and off public land.

Planning efforts to direct urban growth and preserve natural resources, like the NMDGF's *Comprehensive Wildlife Conservation Strategy* (2006), the Vision 2040 Regional Planning Project in Doña Ana County, can help to preserve habitats and populations for special status species.

4.5.2.7 Cultural Resources

Future residential development and construction of infrastructure would disturb cultural resources within the *Planning Area*. The Doña Ana County and Otero County comprehensive plans include provisions to protect and conserve cultural resources.

Future actions that may result in the disturbance of cultural resources include population growth, expansion Fort Bliss and White Sands Missile Range, development of Spaceport America, utility development within the corridors in the *West-Wide Energy Corridor Programmatic EIS*, and construction of desalination plants, roads, highways, and utilities. Recreation could increase on BLM-administered land as a result of population growth, which could result in disturbance of cultural resources, but increased recreation use could increase opportunities for public education and interpretation.

4.5.2.8 Paleontological Resources

Cumulative impacts on paleontological resources may occur through natural processes as well as inadvertent damage from OHV use, casual use, mineral exploration, rockhounding, and recreational collecting of fossils. Unmonitored rockhounding and fossil collecting at known fossil localities have the potential to destroy those localities before they can be scientifically recorded and studied. The designation of the Prehistoric National Monument protects fossil resources within the *Planning Area*. Inventories prior to surface disturbance could decrease the damage from surface-disturbing activities. The transfer of land out of Federal ownership by the BLM and other Federal agencies also has the

potential to cumulatively affect paleontological resources. Once this land is transferred, fossil localities on the land could be damaged and/or destroyed by new developments. Commercial and residential development in response to population growth, road construction, and mineral development on land that is not protected by Federal law or policy could decrease the scientific value of the paleontological resources.

4.5.2.9 Visual Resources

Population growth and its associated development, increases in renewable energy development, construction of military infrastructure, and mineral exploration and developments would have direct impacts on visual resources through increased surface disturbance.

The disposal of BLM land may result in impacts on visual resources through the development of that land. These impacts would likely be localized under Alternatives B, C, and D, since most land that would be available for disposal consists of isolated parcels surrounded by private land that is already developed. The disposal of BLM land through the exchange of other land may offset cumulative impacts on visual resources since the priority for acquisitions includes areas within or adjacent to WSAs and ACECs.

4.5.2.10 Fire and Fuels Management

As development and recreational activities increase, so would the number of potential ignition sources and the probability of wildland fire. This would increase the need for Federal, state, and local agencies to suppress fires to protect life, property, and sensitive resources. Development would increase the amount of wildland-urban interface areas, which would put additional pressure on suppression efforts because these are high-priority areas. The number of accidental ignitions will increase over the life of the plan due to development in areas near Las Cruces, increased human population, and a greater demand for recreation on public land. This cumulative increase would be greatest under Alternative A due to the potential effects of cross-country OHV use. Las Cruces continues to expand into the wildland-urban interface, and the State of New Mexico's Extraterritorial Zoning statute could facilitate development in other unincorporated areas.

Restoration of Chihuahuan semi desert grasslands by the BLM and other agencies would result in plant community changes during the life of the plan. Using only passive or active restoration methods under Alternatives B and D, respectively, could change fire frequency in the *Planning Area*.

4.5.2.11 Wilderness Characteristics

Due to the remote nature of public land identified as containing wilderness characteristics, it is unlikely that impacts on wilderness characteristics would occur from projects such as right-of-way corridors. Mineral activities and motorized recreation use could impact the opportunities to experience naturalness, solitude, and primitive unconfined recreation in land with wilderness characteristics. Mineral activities in areas identified as having wilderness characteristics could increase the likelihood of visitors seeing or hearing other human activities. The sights and sounds of military operations and overhead flight paths could also impact opportunities to experience naturalness and solitude. Other potential impacts on land with wilderness characteristics include the spread of nonnative, invasive vegetation and increased OHV use. As population growth in the *Planning Area* continues, all these activities would degrade areas with wilderness characteristics.

4.5.2.12 Livestock Grazing

Livestock use in the past 10 years has ranged from a low of 288,399 AUMS in 2004 to a high of 439,555 AUMs in 2001. The implementation of BLM's *New Mexico Standards and Guidelines*, mitigation guidelines, vegetation restoration, and monitoring efforts would all provide measures of protection for forage resources. Vegetation, soil and water restoration activities, NMDGF's *Comprehensive Wildlife Conservation Strategy* and rangeland improvements on public could increase available forage and water for wildlife populations and livestock. Rangeland health assessments and the approval of the *NM Standards for Public Land Health* also initiated changes to range management. These management actions would help improve distribution of livestock and wildlife and improve rangeland conditions.

Population growth, industrial developments, and military expansion in the *Planning Area*, particularly near urban areas, could increase recreational and OHV use that would result in disruption of livestock management activities and or injury to livestock. Surface-disturbing activities and construction of roads and infrastructure spread noxious weeds. Vegetation treatments and monitoring efforts would help maintain or improve the quantity and quality of forage.

4.5.2.13 Comprehensive Trails and Travel Management

The recreational use of OHVs would increase as population growth and the popularity of motorized sports vehicles increases. As transmission lines, pipelines, and transportation routes are developed, the access roads to these linear systems or facilities for operations and maintenance could also be used by the public for recreational access. However, land use authorizations, such as public utilities, road construction, and sand and gravel operations, could decrease the amount of public land available for motorized and non-motorized forms of recreation, and impede public access to BLM land. Limitations on cross-country travel on public or state land could increase OHV use and travel opportunities on private land.

The sale of New Mexico State trust land to private parties to support the demand for growth may impact BLM land. These impacts primarily occur when the private land being developed has historically provided access to the public land, and no other access exists. The BLM would attempt to reduce these impacts by obtaining legal access onto public land. Urban population increases may lead to a demand for more hiking trails on public land.

4.5.2.14 Recreation and Visitor Services

The presence of the BLM managed trail and road system, and special recreation management areas, would provide recreation opportunities for the growing urban populations. Recreation based industries would establish. Businesses that seek a quality of life that offers its employees easy access to outdoor recreation would be attracted to the region.

Public land that was formerly remote and used by a small number of people now provides convenient "*backyard*" recreational opportunities that are used on a regular basis. Designating wilderness areas and parks and managing areas for wilderness characteristics and other use-specific land designations may also have small, localized impacts on recreational pursuits due to potential user conflict or incompatibility.

4.5.2.15 Lands and Realty

In communities with substantial population growth, requests for land use authorizations and disposals would increase. Increased population growth would increase the demand for energy and water systems or facilities, such as water-supply projects, and renewable energy developments. This increased demand for

facility development could increase demand for rights-of-way located on BLM-managed land. The development of these services within the *Planning Area* would be precluded on wilderness areas and National monuments and land withdrawn from BLM jurisdiction for military use.

Most development of public utilities and transportation corridors is centralized in the southern portion of the *Decision Area*, north of El Paso, Texas, along Interstate 25 and Interstate 10. In the future, community growth (including military community expansion) and economic development activities would drive the location and types of rights-of-way authorized.

An increase in alternative energy development within the *Planning Area* over the next 25 years could increase the amount of future land use authorization applications received. Depending on the location, size, and design of individual wind energy development projects, wind development would be compatible with a wide variety of existing and future land uses and generally would not preclude other rights-of-way authorizations under any of the alternatives.

4.5.2.16 Minerals: Fluid, Mineral Materials, and Locatable Minerals

The focus of energy resources could shift toward alternative energy development including geothermal energy. It is expected that geothermal leasing and development would likely increase in the future.

4.5.2.17 Socioeconomic Conditions

As statewide and local economies shift towards the services sector and nonlabor sources of income, there is an increased emphasis on the role of public land and its associated recreation and tourism opportunities, as well as on land preservation/open space opportunities with regard to economic development.

The contribution of BLM's proposed actions from the alternatives are unlikely to impact taxes, employment, population growth, relative to long-term development trends or overall development of the area. Long-term demand for recreational use of the *Decision Area* and associated socio-economic activity would increase as a result of population growth.